Department of Transport and Main Roads

Bruce Highway Cooroy to Curra Section D - Detailed Design
Project No. 686965

Offset Management Plan

June 2020

Queensland Government

PROJECT DETAILS	
TMR District	WIDE BAY BURNETT
Project Name	Bruce Highway Cooroy to Curra (Section D – Woondum to Curra)
Project Number	686965
Project Location	Woondum to Curra
Local Government Area	Gympie Regional Council

PROPONENT ACCEPTANCE			
DEPARTMENT OF TRANSPORT AND MAIN ROADS			
Name	Mark Asong	**Signature**	M. Asong
Position	C2C-D - PROJECT DIRECTOR	**Date**	24/6/2020
GYMPIE REGIONAL COUNCIL			
Name	PAULINE GORDON	**Signature**	Pauline Gordon
Position	A/ CEO	**Date**	24/6/2020

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Acronyms and abbreviations

Acronym/abbreviation	Description
bd	Business day
DAWE	(Commonwealth) Department of Agriculture, Water and the Environment
DES	(Queensland) Department of Environment and Science
DNRME	(Queensland) Department of Natural Resources, Mines and Energy
EPBC Act	(Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*
GRC	Gympie Regional Council
ha	hectares
km	kilometres
Lowland Rainforest	Lowland Rainforest of Subtropical Australia
m	metres
MNES	Matter of National Environmental Significance
NC Act	(Queensland) *Nature Conservation Act 1992*
OMP	Offset Management Plan
PMAC	Property Map of Assessable Vegetation
RE	Regional Ecosystem
SCC	Sunshine Coast Council
SQP	Suitably Qualified Person
TEC	Threatened Ecological Community
TMR	(Queensland) Department of Transport and Main Roads
VDec	Voluntary Declaration
VMA	(Queensland) *Vegetation Management Act 1999*
WONS	Weed of National Significance

Revision Register

Revision No.	Revision Date	Section Reference	Description of Change	Author	Reviewer	Approved by
Draft	09/02/2020	All Sections	Draft	S. Potts (GHD Pty Ltd)	Peter Moonie (Red Ash Consulting)	NA
Rev 0	04/06/2020	All Sections	Final Issue	S. Potts (GHD Pty Ltd)	Philip Bradley (GHD Pty Ltd)	GHD/TMR
Rev 0.1	16/06/2020	All Sections	Removed references to the Lowland Rainforest TEC offset areas	S. Potts (GHD Pty Ltd)	Justin Sanderson (TMR)	GHD/TMR

1. Introduction

1.1 Background

The Department of Transport and Main Roads (TMR) has received conditions of approval (EPBC 2017/7941) from the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Bruce Highway Project: Cooroy to Curra Section D (Woondum to Curra) project ('the project'). The conditions were received on 24 September 2019, with a variation approved on 20 April 2020.

A number of the conditions of approval relate to the delivery of specific offset requirements. Accordingly, this Offset Management Plan has been prepared to address the following conditions:

- Condition 9 – Secure koala and black-breasted button-quail offset areas
- Condition 10 – Baseline surveys of koala and black-breasted button-quail offset areas
- Condition 11 – Offset Management Plan requirements for koala and black-breasted button-quail offset areas
- Condition 12 – Outcomes driven conditions to be delivered through the Offset Management Plan

The relevant conditions are included in Appendix A.

This Offset Management Plan (OMP) has been prepared in accordance with the *Environmental Management Plan Guidelines* (DAWE, 2014) and the principles of the *EPBC Act Environmental Offsets Policy* (DAWE, 2012).

1.2 Purpose of this report

This OMP has been prepared to guide the delivery and compliance of offset requirements specified in the approval conditions issued by DAWE for the project. MNES that require delivery of an offset include the following:

- Koala (*Phascolarctos cinereus*) - vulnerable under the EPBC Act and the *Nature Conservation Act 1992* (NC Act)
- Black-breasted button-quail (*Turnix melanogaster*) – vulnerable under the EPBC Act and the NC Act

This OMP will also be submitted to the Queensland Department of Natural Resources, Mines and Energy (DNRME) in support of a voluntary declaration (VDec) application to secure each offset parcel. In this regard, requirements identified by the *Guide to Voluntary Declarations under the Vegetation Management Act 1999 (effective 21 June 2019)* (State of Queensland, 2019) have been addressed within this OMP.

1.3 Structure of this report

This OMP provides the following information:

- Section 1 outlines the purpose, structure, main agency responsibilities and contact details, key approval conditions timeline and OMP review schedule
- Section 2 outlines the offset sites for the koala and black-breasted button-quail
- Section 3 outlines the information required for legally securing the offset areas through a request for voluntary declaration
- Section 4 contains the Koala offset management details

- Section 5 contains the Black-breasted button-quail offset management details
- Section 6 provides a risk framework for assessing the success of implementation of the management measures

The relevant EPBC Act project approval conditions are included in Appendix A.

1.4 Land ownership and management

The overarching responsibility for the satisfaction of conditions relating to this OMP belongs to TMR.

The management of the relative offset areas in accordance with this OMP will be undertaken by TMR on the TMR-owned land and Gympie Regional Council (GRC) land. The contact details for these land owners are provided in Table 1-1.

A description of each offset area land parcel, including lot on plan, owner, tenure and total size, is provided in the table in Section 2.1.

Table 1-1 Land owner contact details

No. land parcels	MNES offset	Registered owner	Contact details
8	Koala, Black-breasted button-quail	TMR	Postal address: PO Box 183, Gympie QLD 4570 Phone: (07) 5482 0333 General email: brucehwyc2c@tmr.qld.gov.au Contact person 1: Adam Whittaker (mobile: 0490092665; email: adam.m.whittaker@tmr.qld.gov.au) Contact person 2: Justin Sanderson (mobile: 0429549275; email: justin.k.sanderson@tmr.qld.gov.au)
5	Koala	GRC	Postal address: PO Box 155, Gympie QLD 4570 Phone: (07) 5481 0904 Contact person: Lawry O'Brien Email: lawry.o'brien@gympie.qld.gov.au

The land owners and/or TMR will engage the following specialist contractors as required in accordance with this OMP:

- Suitably qualified person/s (SQP) to undertake baseline and monitoring surveys
- Planting contractors to undertake replanting and rehabilitation programs
- Weed control contractors to undertake weed management programs
- Pest control contractors to undertake pest control programs
- Contractors for vegetation or infrastructure maintenance or installation of infrastructure, such as fencing

It will be the responsibility of these contractors to undertake their operations in accordance with this OMP.

1.5 Approval conditions timeline

The key requirements of approval conditions are provided in Table 1-2, including timing and indicative dates that tasks are proposed to occur. This timeline may be updated prior to or following legally securing or commencement of the action.

Table 1-2 Key approval requirements and timeframes

Approval requirement	Timing	Indicative dates*
Submit Request for a Voluntary Declaration application, including Offset Management Plan (this report), to legally secure	Prior to commencement	Q2 2020
Voluntary Declaration approval and issue of PMAV (legally secured and Offset Management Plan and PMAV take effect)	Prior to commencement	Q2 2020
Notify DAWE of date of legally securing within 20 business days (bd)	Prior to commencement	Q2 2020
Notify DAWE of commencement of action within 10 bd of construction works starting	Commencement	June 2020
Baseline surveys of koala offset areas	Within six months of legally securing offset areas	Q3 2020
Baseline surveys of black-breasted button-quail offset areas	Within six months of legally securing offset areas	Q3 2020
Provide results of koala and black-breasted button-quail baseline surveys (and management measures, independently reviewed) to DAWE and publish on website	Within one year of legally securing offset areas	Q1 2021
Review and provide updated Offset Management Plan (this report) to DAWE and publish on website	Within one year of legally securing offset areas	Q1 2021
Implement koala food tree replanting program	Within one year of baseline surveys	Q1 2021
Implement scheduled monitoring of black-breasted button-quail offset areas	Within one year of baseline surveys	Biennially, Q3 of Years one (2021), three (2023) and five (2025), then at Year 10 if needed +
Implement scheduled monitoring of koala offset areas	Within one year of baseline surveys	Biennially, Q3 of Years one (2021), three (2023) and five (2025), then at Year 10 if needed +
Annual compliance reporting	Within one year of commencement	Annually until all approval conditions met

Approval requirement	Timing	Indicative dates*
Demonstrate 50% reduction^ in weed infestations for koala and black-breasted button-quail offset areas	Within three years of baseline surveys	Q3 2023 +
Conduct koala density/utilisation surveys	Within five and 10 years of baseline surveys	At Years five (2025) and 10 (2030), if needed +
Demonstrate 90% reduction^ in weed infestations for koala and black-breasted button-quail offset areas	Within 10 years of baseline surveys	Q3 2030, or earlier if demonstrated +
Demonstrate reduction^ in pest abundance for koala and black-breasted button-quail offset areas	Within 10 years from baseline surveys	Q3 2030 +
Demonstrate 20% increase^ in koala food tree recruitment	Within 15 years of baseline surveys	Q3 2035, or earlier if demonstrated
Demonstrate 50% increase^ in koala density/utilisation	Within 15 years of baseline surveys	Q3 2035, or earlier if demonstrated
Notify DAWE and provide completion data when conditions have been fully met	Within 20 bd of completion	2040 (or earlier as demonstrated and negotiated with DAWE)

* Quarter relates to calendar year

^ When compared to baseline data

+ Note: The timing of baseline surveys and subsequent monitoring surveys may be amended following timing of legal securing, so that timing of events are seasonally appropriate, as well as comparable across years, to demonstrate the condition of the sites and changes occurring.

1.6 Review of Offset Management Plan

1.6.1 Post-baseline

The management actions outlined in this OMP will be reviewed and updated after the baseline surveys have been completed in order to incorporate further site-specific information. This will include updates to the following details if relevant, to be shown on the relevant maps and/or described in relevant sections of this OMP:

- Additional evidence of presence of koala and black-breasted button-quail
- Weed infestations to be targeted
- Evidence of fauna pest species
- Locations of existing infrastructure
- Locations and descriptions of areas to target for planting programs and natural regeneration
- Locations of relevant disturbances and threats to be managed/removed
- Proposed replacement, maintenance or removal of infrastructure

- Associated methods, equipment and timing of management actions as deemed necessary to meet the ecological outcomes

In accordance with the EPBC 2017/7941 approval conditions, the OMP will be reviewed by an independent SQP prior to being published on the TMR website and provided to DAWE (within one year of legally securing the offset areas).

The document review register at the start of the document will reflect sections that are updated.

1.6.2 Annually or as needed

TMR may review this OMP after the annual monitoring events or at the end of any applicable management period, with consideration of the conditions outlined in EPBC 2017/7941. Any review of management actions or criteria may need to be undertaken in consultation with DAWE.

For the life of the OMP, the management actions may be reviewed and updated as needed to enable the offset areas to satisfy the conditions of approval. Updates may be triggered by unforeseen disturbances with remedial action required, advances in revegetation/rehabilitation techniques and further knowledge of the applicable species/habitats. Any changes to the OMP must comply with the offset obligations and the intent of the original document.

The document review register at the start of the document will reflect sections that are changed.

1.7 Scope and limitations

This report has been prepared by GHD for TMR and may only be used and relied on by TMR for the purpose agreed between GHD and TMR as set out in this report.

GHD otherwise disclaims responsibility to any person other than TMR arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by TMR and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Overview of Offset Areas

2.1 Offset areas summary

Offset areas within a total of 13 land parcels will be secured in order to deliver the offset obligations for the project. Details of the property descriptions, ownership and areas for each of the MNES offset values are summarised in Table 2-1.

The total offset areas to be legally secured through the voluntary declaration process are shown in Figure 1.

The koala and black-breasted button-quail offset sites are shown in Figure 2 and Figure 3, respectively.

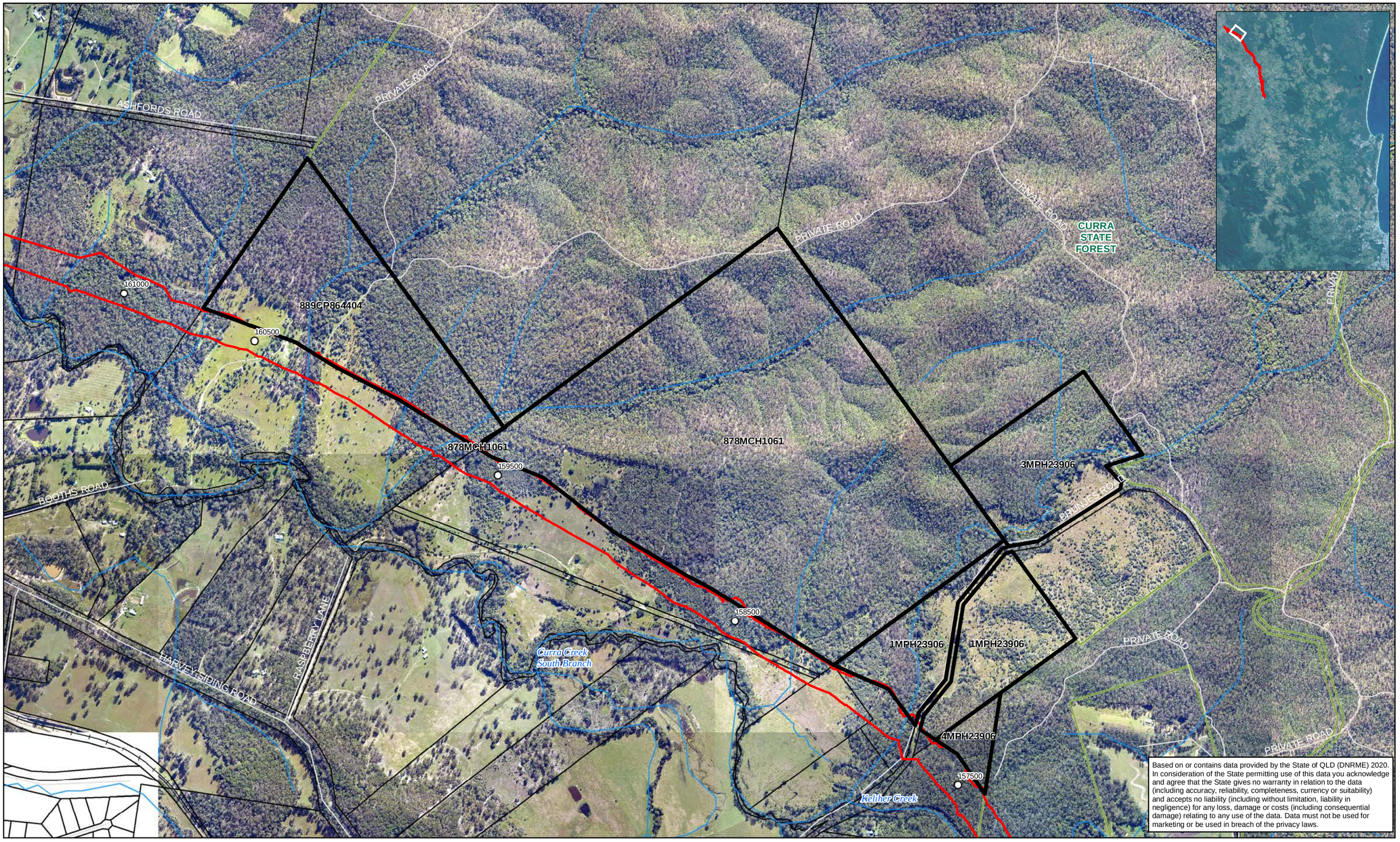
Further descriptions of each of the offset areas are provided in the following sections.

Table 2-1 Summary of offset areas

Offset area name	Lot on plan* Address*	Ownership	Tenure	Offset area (ha)	Total area to secure (ha)	Total lot area (ha)*
Koala						
K-OA1	Lot 2 SP302526 93 Woondum Rd, Kybong	TMR	Freehold	**11.43**	15.20	40.71
K-OA2	Lot 3 SP302524 95 Woondum Rd, Kybong	TMR	Freehold	**21.37**	28.25	34.59
K-OA3	Lot 102 SP297908 Cnr Keefton Rd and Bruce Highway	TMR	Freehold	**12.38**	12.65	13.77
K-OA4	Lot 4 MPH23906 139 Brunjes Rd, Curra	TMR	Freehold	**3.46**	3.46	15.67
K-OA5	Lot 1 MPH23906 1434 Harvey Siding Rd, Curra	TMR	Freehold	**9.96**	27.69	32.32
K-OA6	Lot 3 MPH23906 1434 Harvey Siding Rd, Curra	TMR	Freehold	**19.53**	22.97	22.99
K-OA7	Lot 878 MCH1061 62 Raspberry Lane, Curra	TMR	Freehold	**124.56**	144.56	198.09

Offset area name	Lot on plan* Address*	Ownership	Tenure	Offset area (ha)	Total area to secure (ha)	Total lot area (ha)*
K-OA8	Lot 889 CP864404 69 Booths Rd, Curra	TMR	Freehold	**33.09**	40.79	97.12
K-OA9	Lot 1 MPH23904 Banks Pocket Rd, Araluen	GRC	Freehold	**5.86**	5.86	6.09
K-OA10	Lot 1 MPH5670 Banks Pocket Rd, Araluen	GRC	Freehold	**2.02**	2.02	2.02
K-OA11	Lot 2 MPH14193 Banks Pocket Rd, Araluen	GRC	Freehold	**7.27**	7.27	7.32
K-OA12	Lot 763 MCH5342 Banks Pocket Rd, Araluen	GRC	Freehold	**3.58**	3.58	3.58
K-OA13	Lot 19 SP299683 15 Belvedere Rd, Veteran	GRC	Freehold	**26.09**	26.87	33.66
TOTAL KOALA OFFSET AREA = Approx. 280.61 ha						
Black-breasted button-quail						
BBBQ-OA1	Lot 2 SP302526 93 Woondum Rd, Kybong	TMR	Freehold	**13.63**	15.20	40.71
BBBQ-OA2	Lot 3 SP302524 95 Woondum Rd, Kybong	TMR	Freehold	**7.83**	28.25	34.59
BBBQ-OA3	Lot 102 SP297908 Cnr Keefton Rd and Bruce Highway, Kybong	TMR	Freehold	**11.22**	12.65	13.77
TOTAL BLACK-BREASTED BUTTON-QUAIL OFFSET AREA = Approx. 32.68 ha						

* Several addresses may change due to the intersection of the land parcel by the future road corridor; future resumptions may require new lot on plan numbers to be applied to these land parcels and total lot areas may change



Based on or contains data provided by the State of QLD (DNRME) 2020. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

Paper Size A3

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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Railway
- Road/Track
- Voluntary Declaration Areas
- Project Footprint
- Cadastre

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Areas - Voluntary Declaration

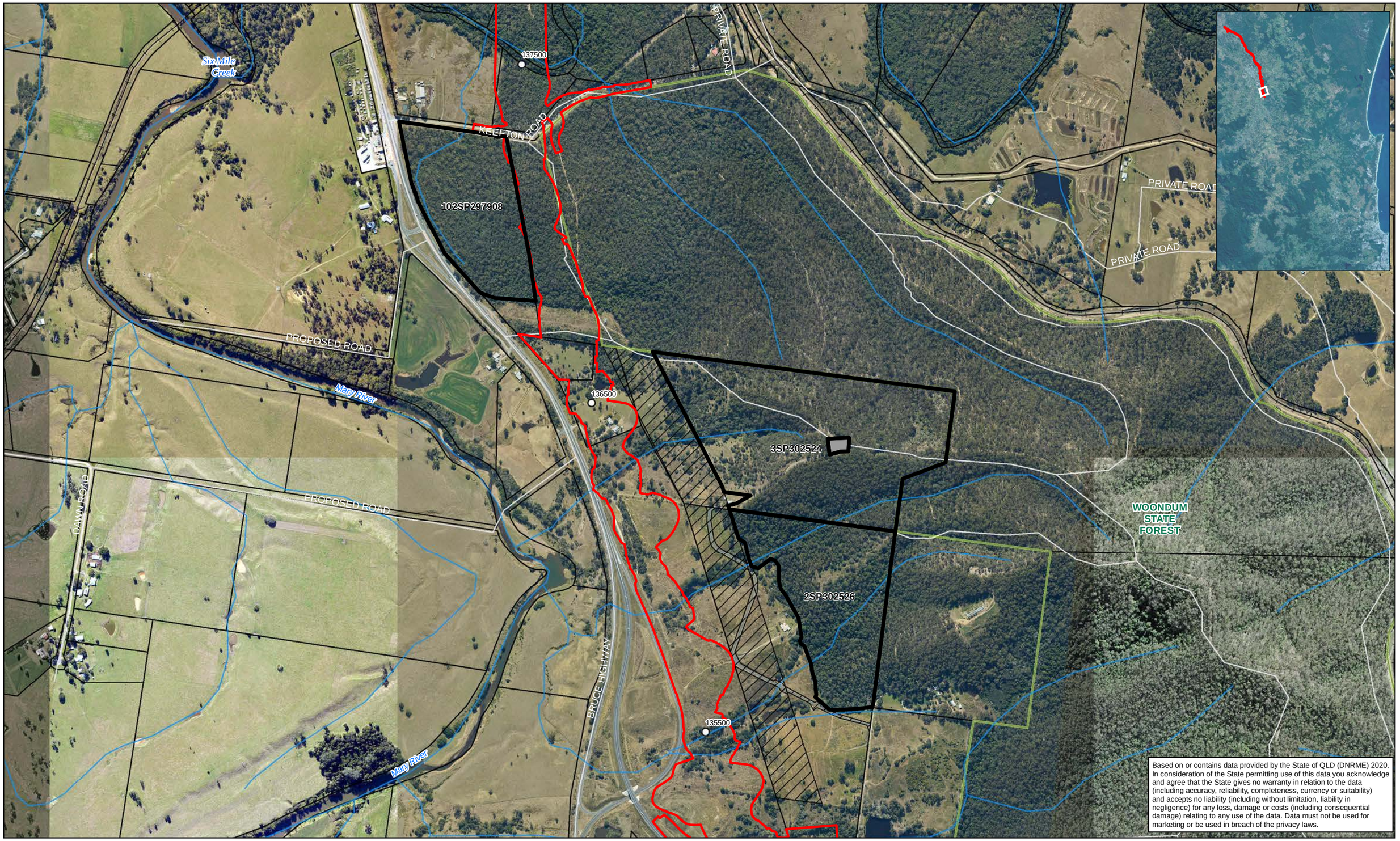
Job Number	41-29914
Revision	C
Date	28 Apr 2020

Figure 1
Sheet 1 of 3

N:\AU\Brisbane\Projects\41\29914\GIS\Maps\MXD\Environmental\41_29914_3111_OMP_Offset Locality_revC.mxd

6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

Data source: DNRME: Watercourse (2010), Rail (2014), Towns (2015), Imagery, Roads (2016), Cadastre (2019), Protected Areas (2020); TMR: Chainage (2016), Imagery (2018/2019). GHD: Project Area (December 2016), Futures Easement, Voluntary Declaration Area (2020). Created by:IHamilton



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- 1km Chainage
- Railway
- Watercourses
- Road/Track
- Voluntary Declaration Areas
- Excluded
- Project Footprint
- Cadastre
- Easement

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Areas - Voluntary Declaration

Job Number	41-29914
Revision	C
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Figure 1
Sheet 2 of 3

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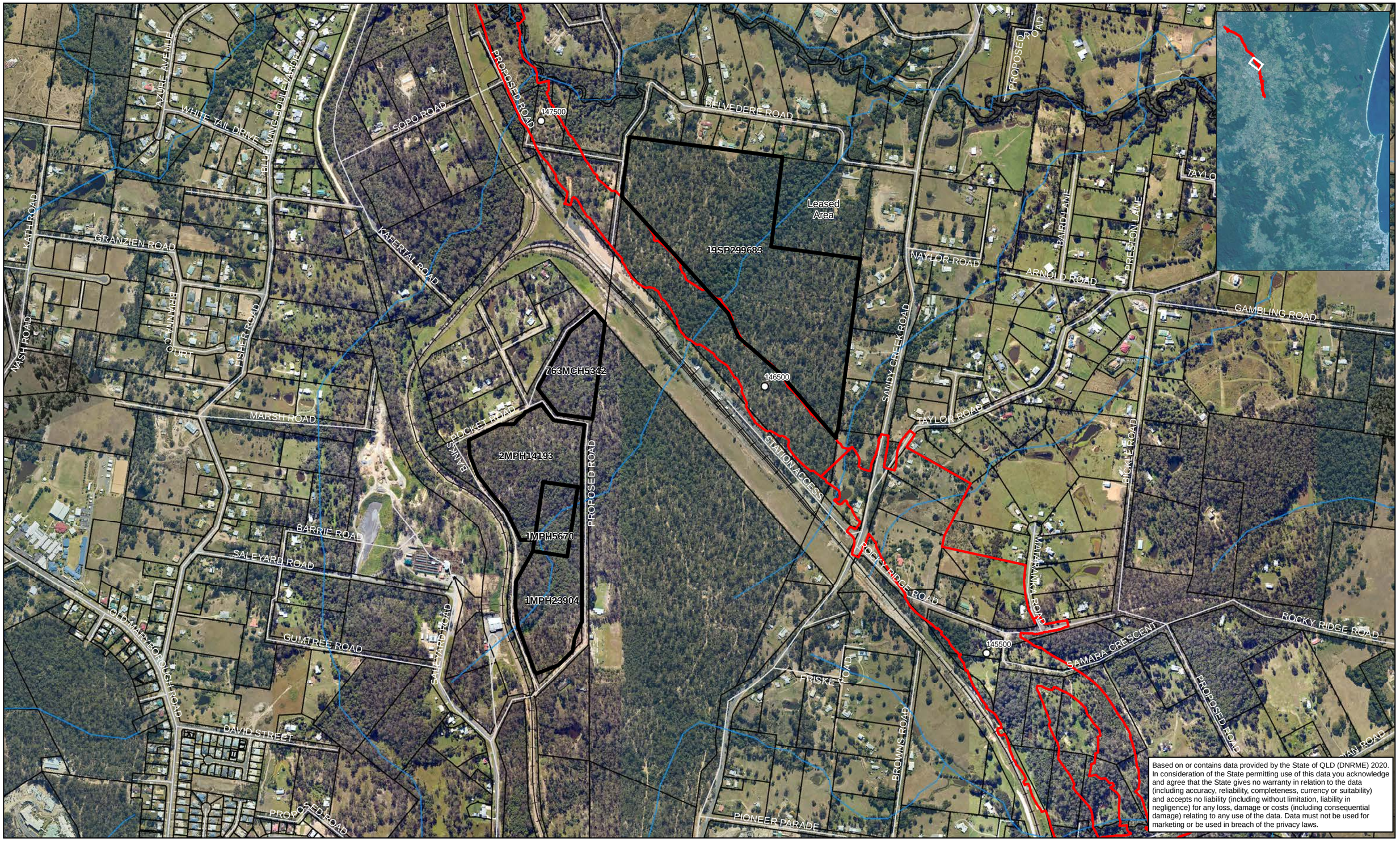
Data source: DNRME: Watercourse (2010), Rail (2014), Towns (2015), Imagery, Roads (2016), Cadastre (2019), Protected Areas (2020); TMR: Chainage (2016), Imagery (2018/2019). GHD: Project Area (December 2016), Futures Easement, Voluntary Declaration Area (2020). Created by:lHamilton



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Paper Size A3

0 200 400

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- 1km Chainage
- Railway
- Watercourses
- Road/Track
- Voluntary Declaration Areas
- Project Footprint
- Cadastre

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Areas - Voluntary Declaration

Job Number 41-29914
Revision C
Date 28 Apr 2020

Figure 1
Sheet 3 of 3

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Data source: DNRME: Watercourse (2010), Rail (2014), Towns (2015), Imagery, Roads (2016), Cadastre (2019), Protected Areas (2020); TMR: Chainage (2016), Imagery (2018/2019). GHD: Project Area (December 2016), Futures Easement, Voluntary Declaration Area (2020). Created by:lHamilton

6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

3. Legal Security

The offset areas identified in Section 2 will be legally secured through a Voluntary Declaration (VDec) applied for by TMR. A VDec is an option under the *Vegetation Management Act 1999* (VMA) that provides a simplified, streamlined process for landholders to voluntarily protect areas of native vegetation not otherwise protected by the VMA. A VDec can be used to protect areas of high nature conservation values or areas vulnerable to land degradation, and to secure areas of land to satisfy statutory offset requirements.

3.1 Voluntary Declaration requirements

As the proponent, TMR will send a Request for a Voluntary Declaration to DNRME to cover all of the offset areas (excluding the Kawana offset site, which will be applied for separately).

The information that TMR will provide to DNRME, as outlined in the *Guide to Voluntary Declarations under the Vegetation Management Act 1999* (effective 21 June 2019) (State of Queensland, 2019), will include:

- Written consent from all registered 'owners' of the areas proposed for declaration as offset areas (refer to Section 3.2)
- A record of all registered interest holders over the declared areas, with written consent of all registered interest holders to be provided once DNRME has considered the request, and prior to the making of any declaration. Registered interests include mortgages, leases and easements (refer to Section 3.2)
- A description of the purpose of the VDec (refer to Section 3.3)
- An explanation of how the area meets the criteria of high nature conservation value, such as a centre of endemism, an area containing a vegetation clump or corridor that contributes to the maintenance of biodiversity, or an area that makes a significant contribution to the conservation of biodiversity (refer to Section 3.4)
- A copy of the Offset Management Plan signed by TMR (this report), which states the management intent and management outcomes, the activities to be carried out or removed to achieve the management outcomes, and restrictions to use or access to achieve the management outcomes

Evidence that the responsible agency (DAWE) has endorsed the offset delivery plan for the offset areas is not applicable, as DAWE will not be authorising this OMP prior to implementation.

The declaration will include:

- Declaration notice
- Declared area code (if proposed)
- Property Map of Assessable Vegetation (PMAV) showing the offset areas as Category A areas
- Declared area management plan, including a map of the declared areas

The declaration takes effect from the date the chief executive signs the declaration notice. The PMAV and Offset Management Plan have effect from the same date.

There are no statutory timeframes for the VDec application process, however an indicative timeframe for the process of legally securing the offset sites and the ongoing monitoring, outcome and compliance reporting requirements is provided in Table 1-2.

3.2 Registered owners and interest holders

The owners of the offset area land parcels, as defined in the VMA, include TMR and GRC (refer to contact details in Section 1.4).

A description of each offset area land parcel, including lot on plan, owner, tenure and total size, is provided in the table in Section 2.1.

Several registered interests occur on the offset area land parcels, as outlined in Table 3-1. The entirety of each easement/lease has been excluded from the proposed offset areas, apart from the existing PMAV area on Lot 878 on MCH1061. This is a TMR-owned lot, for which a replacement PMAV will be requested under Section 20D of the VMA.

Therefore, consent of the registered interest holders is not required, as the offsetting activities will not infringe on existing easements/leases held by other parties.

Table 3-1 Registered interests over subject land parcels

Lot on plan	Registered interest
2 on SP302526	Easement in gross - Qld Electricity Commission (Powerlink) Easement over access route
3 on SP302524	Easement in gross - Qld Electricity Commission (Powerlink)
19 on SP299683	Lease A on SP124322 (Gympie Pistol Club - 01/07/2011-30/06/2021)
878 on MCH1061	Veg Notice - lodged 12/08/2010 (VMA 1999) - PMAV 2009/009678

3.3 Purpose of the VDec

The purpose of the VDec is to provide legal security for the protection of offset areas for several MNES as required by the EPBC 2017/7941 approval conditions under the EPBC Act.

3.4 High nature conservation values

It is considered that the offset areas meet the following criteria for high nature conservation values:

- An area containing a vegetation clump or corridor that contributes to the maintenance of biodiversity
- An area that makes a significant contribution to the conservation of biodiversity

3.4.1 Koala offset area values

Key threats to the koala include habitat loss and fragmentation, habitat degradation, road kills, dog attacks, fire, logging, disease, severe weather conditions, swimming pools, and over browsing leading to starvation (DECC, 2008).

The areas to be legally secured to satisfy offset requirements for the koala include areas of existing remnant habitat, areas mapped as regrowth surrounding remnant habitat (which may consist of remnant, mature regrowth or areas of less structure that contain some non-juvenile and juvenile koala habitat trees) and disturbed non-remnant areas that will be targeted for replanting and natural regeneration in order to increase the extent and connectivity of koala habitat in the offset areas. The offset areas include several “hot-spots” where higher koala utilisation rates were observed, particularly for this region around Gympie.

For koala, the offset area protection and management will assist in achieving priority management actions or objectives listed in the Recovery Plan for the Koala (DECC, 2008), that this offset provision is consistent with, through the following conservation gains:

- The maintenance and improvement of habitat quality for the species
- Protection of otherwise unprotected areas on freehold properties where the species occurs, occasionally in relatively high numbers
- Obtaining more detailed information relating to the abundance of the local koala population
- Maintaining connectivity of suitable habitat with large areas of remnant vegetation community within Woondum State Forest and Curra State Forest, which will reduce the potential for threats to impact the species and habitat through providing more movement opportunities and habitat available for occupancy
- Active monitoring and management of threats
- Engaging in strategies that actively protect the species from the introduction or spread of threats, such as the wild dog abatement program, the management of which aids in the overall recovery of the species

Several of these koala offset areas also contain existing populations and a translocation site for the Commonwealth and State-listed *Macrozamia pauli-guilielmi* (pineapple zamia).

There are also habitat values for black-breasted button-quail and other fauna species across parts of these offset lots.

3.4.2 Black-breasted button-quail offset area values

Key threats to the black-breasted button-quail include the following processes or activities:

- Loss of habitat and habitat fragmentation due to clearing for a range of purposes including agriculture, logging and urban development
- Habitat degradation as a result of domestic stock and feral pigs utilising black-breasted button-quail habitat
- Habitat loss or degradation due to inappropriate fire regimes
- Predation by feral animals (Mathieson & Smith, 2009)

The offset areas for the black-breasted button-quail are considered to be suitable habitat with potential populations present that are restricted to fragmented and relatively isolated patches of habitat around Woondum State Forest. Securing these offset areas provides protection for connected and vegetated habitat (remnant, regrowth and non-remnant) on freehold, rural residential land.

For the black-breasted button-quail, the offset area protection and management will assist in achieving priority management actions or objectives listed in the National Recovery Plan for the Black-breasted Button-quail (Mathieson & Smith, 2009), that this offset provision is consistent with, through the following conservation gains:

- The maintenance and improvement of habitat quality for the species
- Protection of otherwise unprotected areas on freehold properties where the species occurs
- Obtaining more detailed information relating to the abundance of the local black-breasted button-quail population
- Maintaining connectivity of the habitat with large areas of remnant vegetation community within Woondum State Forest, which will reduce the potential for threats to impact the species and habitat through providing more movement opportunities and habitat available for occupancy
- Active monitoring and management of threats
- Engaging in strategies that actively protect the species from the introduction or spread of threats, such as the pest animal control program

One of these parcels also contains an existing population and translocation site for the State-listed *Marsdenia coronata* (slender milkvine).

Another parcel contains a significant area of Lowland Rainforest of Subtropical Australia Threatened Ecological Community listed under the EPBC Act.

There are also areas of koala habitat on these properties.

4. Koala

4.1 Term of offset management plan

The commencement of the Project action is scheduled to occur in June 2020.

The offset areas will be legally secured prior to commencement, as outlined in Section 1.5 and described in Section 3.

The management actions and criteria outlined in this OMP shall be delivered and achieved by TMR, or on behalf of TMR by the 15th anniversary of completing baseline surveys of the offset areas, anticipated as 2035, unless demonstrated earlier and negotiated with DAWE. Reporting of completion of ecological outcomes will be provided in annual compliance reporting at the end of the relevant year following commencement.

This section of the OMP has been prepared to satisfy the approval conditions as set out in Table 4-1.

Table 4-1 Approval conditions applicable to koala offsets

Condition	Timing	Evidence of compliance	Section of OMP
9 Legally secure koala offset areas	Prior to commencement	Within 20 bd of legally securing (prior to commencement), provide to DAWE the date of legally securing and electronic spatial data and offset attributes	Section 1.5 Approval conditions timeline Section 3 Legal Security
10 Complete baseline surveys	Within six months of legally securing	Within one year of legally securing, publish on website and provide to DAWE results of baseline surveys	Section 5.4 Baseline and monitoring surveys
11 Provide results of baseline surveys and management measures	Within one year of legally securing	Within one year of legally securing, publish on website and provide to DAWE results of baseline surveys AND details of management measures and risk assessment to deliver outcomes	Section 5.4.5 Baseline survey - Reporting Section 5.5 Offset delivery
12a Ensure no net loss^ in quality and extent of koala habitat	Within one year of baseline survey	Compliance reporting, completion data	Section 5.4 Baseline and monitoring surveys Section 5.5.3-5.5.6 Offset delivery
12b Implement ongoing koala food tree replanting program	Within one year of baseline survey	Compliance reporting	Section 5.4 Baseline and monitoring surveys Section 5.5.3 Revegetation and

Condition	Timing	Evidence of compliance	Section of OMP
			regeneration management
12c Demonstrate 20% increase^ in koala food tree recruitment	Within 15 years of baseline survey	Compliance reporting, completion data	Section 5.4 Baseline and monitoring surveys Section 5.5.3 Revegetation and regeneration management
12d i. Demonstrate 50% reduction^ in weed infestations for koala offset areas	Within three years of baseline survey	Compliance reporting	Section 5.4 Baseline and monitoring surveys Section 5.5.4 Weed management
12d ii. Demonstrate 90% reduction^ in weed infestations for koala offset areas	Within 10 years of baseline survey	Compliance reporting, completion data	Section 5.4 Baseline and monitoring surveys Section 5.5.4 Weed management
12e Conduct koala density/utilisation surveys	Within one, five and 10 years of baseline survey	Compliance reporting	Section 5.4 Baseline and monitoring surveys Section 5.5.3 Revegetation and regeneration management
12e Demonstrate 50% increase^ in koala density/utilisation	Within 15 years of baseline survey	Compliance reporting, completion data	Section 5.4 Baseline and monitoring surveys Section 5.5.3 Revegetation and regeneration management
12f Demonstrate a reduction^ in pest abundance	Within 10 years of baseline survey	Compliance reporting, completion data	Section 5.4 Baseline and monitoring surveys Section 5.5.5 Pest animal management
12g and 20 Annual compliance reporting	Annually	Compliance report provided each 12 month period following date of commencement and publish on website within 60 bd	Section 5.7

^ compared to the baseline survey results

4.2 Offset management responsibility

For the life of the OMP, information regarding the proposed works and maintenance of the TMR and GRC-owned koala offset areas can be obtained from TMR.

Any existing residences within the cleared portions of the subject lots will potentially be tenanted for the duration of the management period.

4.3 Offset area locations and descriptions

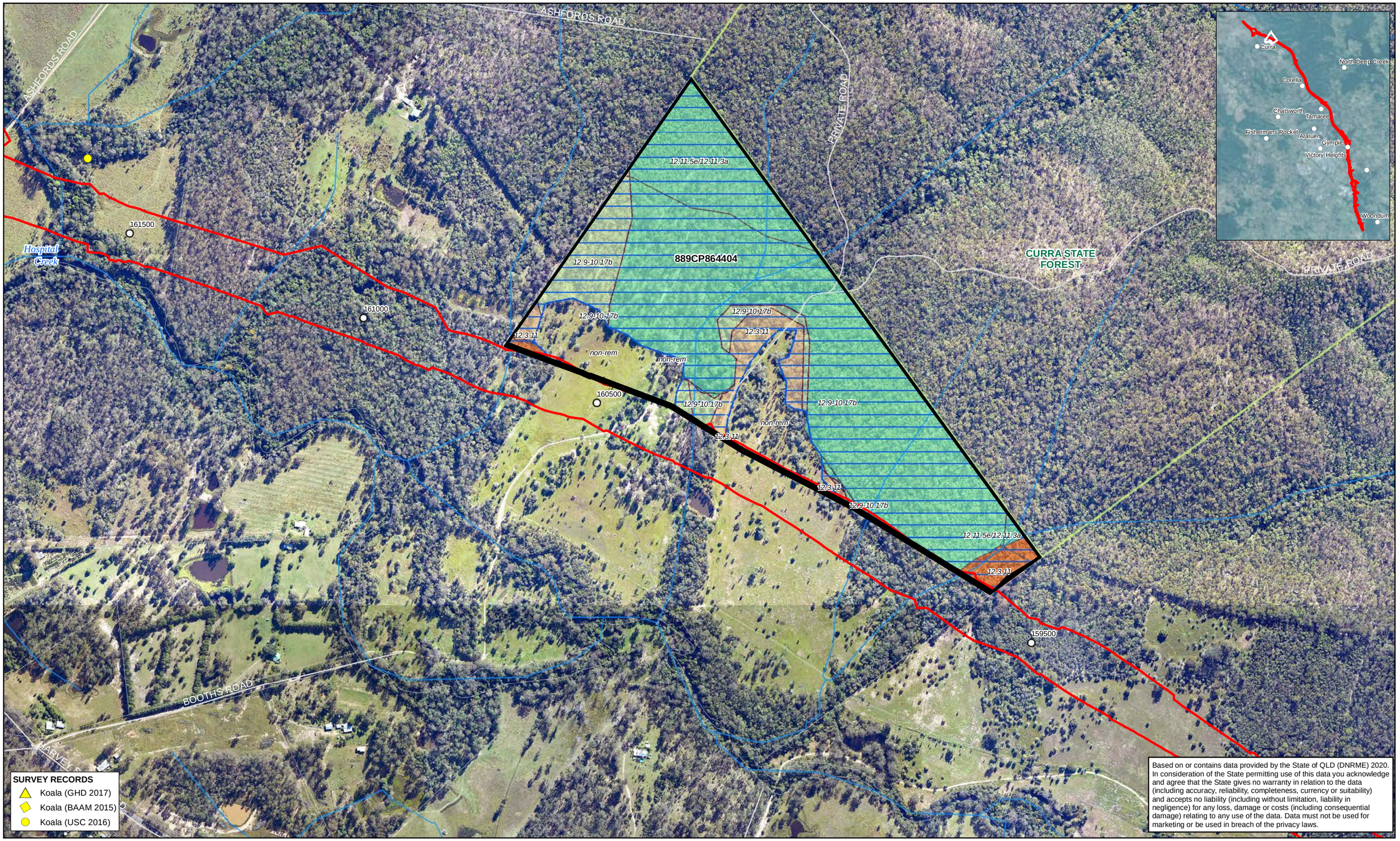
The offset areas for the koala are outlined in Table 4-2 below. The total lot area to be legally secured includes the non-remnant or regrowth habitats that will be replanted and/or naturally regenerated, as well as offset areas for other MNES. The offset areas for each lot are shown on Figure 2.

Each area is further described in terms of koala habitat characteristics, access, existing known threats and disturbances and offset management goals in Table 4-3.

Table 4-2 Koala offset areas

Offset area name	Lot on plan*	Ownership	Tenure	Offset area (ha)	Total area to be secured (ha)
K-OA1	Lot 2 SP302526	TMR	Freehold	**11.43**	15.20
K-OA2	Lot 3 SP302524	TMR	Freehold	**21.37**	28.25
K-OA3	Lot 102 SP297908	TMR	Freehold	**12.38**	12.65
K-OA4	Lot 4 MPH23906	TMR	Freehold	**3.46**	3.46
K-OA5	Lot 1 MPH23906	TMR	Freehold	**9.96**	27.69
K-OA6	Lot 3 MPH23906	TMR	Freehold	**19.53**	22.97
K-OA7	Lot 878 MCH1061	TMR	Freehold	**124.56**	144.56
K-OA8	Lot 889 CP864404	TMR	Freehold	**33.09**	40.79
K-OA9	Lot 1 MPH23904	GRC	Freehold	**5.86**	5.86
K-OA10	Lot 1 MPH5670	GRC	Freehold	**2.02**	2.02
K-OA11	Lot 2 MPH14193	GRC	Freehold	**7.27**	7.27
K-OA12	Lot 763 MCH5342	GRC	Freehold	**3.58**	3.58
K-OA13	Lot 19 SP299683	GRC	Freehold	**26.09**	26.87

* Future resumptions due to the intersecting of the land parcels by the future road corridor may require new lot on plan numbers to be applied



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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- 1km Chainage
- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA8

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Of Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads
Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Job Number 41-29914
Revision E
Date 28 Apr 2020

Koala Offset Area K-OA8
889CP864404

Figure 2
Sheet 1 of 9

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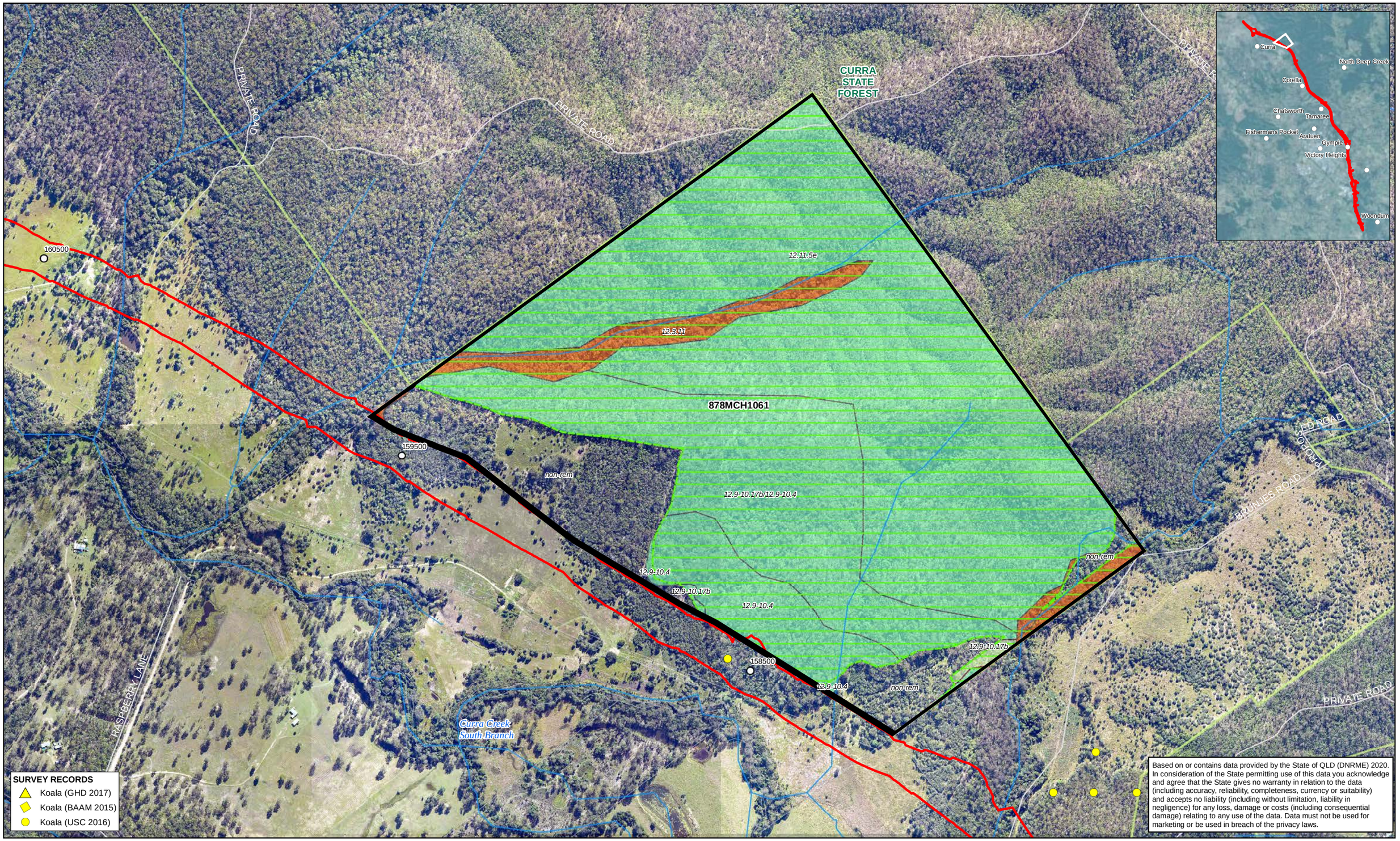
6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

Data source: DNRME: Watercourse (2010), RE v11, Cadastre (2019), Rail (2014), Roads (2016), Towns (2015), Protected Areas (2020); TMR: Chainage (2016), Imagery (2018/2019). GHD: Project Area (December 2016), Koala Records (2017); Ground truthed Regional Ecosystem, Offset Sites (2019/2020). USC/ERM/BAMM: Koala Records (2015/2016). Created by:IHamilton



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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- 1km Chainage
- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA7

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Koala Offset Area K-OA7

878MCH1061

Job Number 41-29914
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Date 28 Apr 2020

Figure 2
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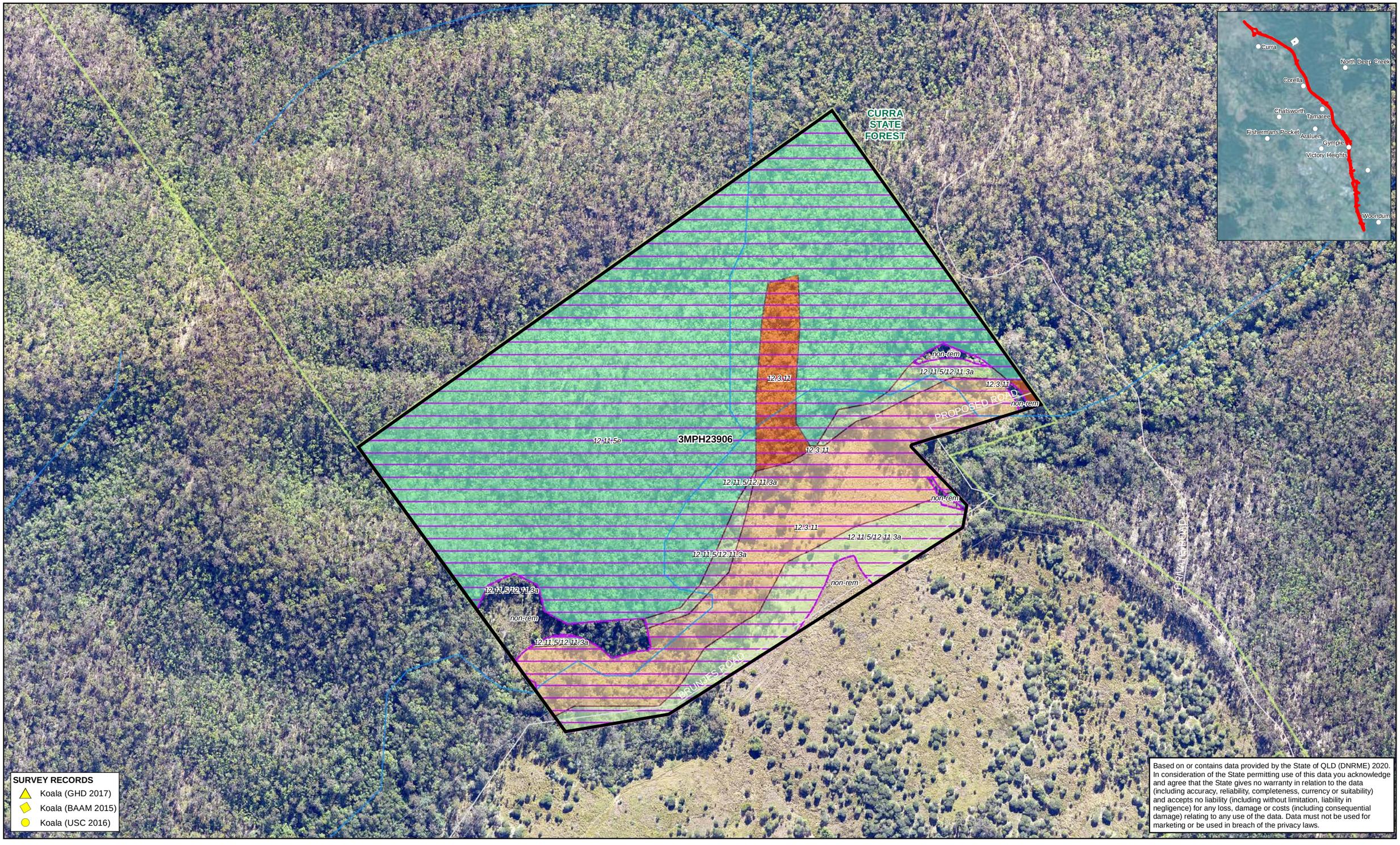

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Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Property Boundary
- K-OA6

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Of Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Koala Offset Area K-OA6

3MPH23906

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Figure 2
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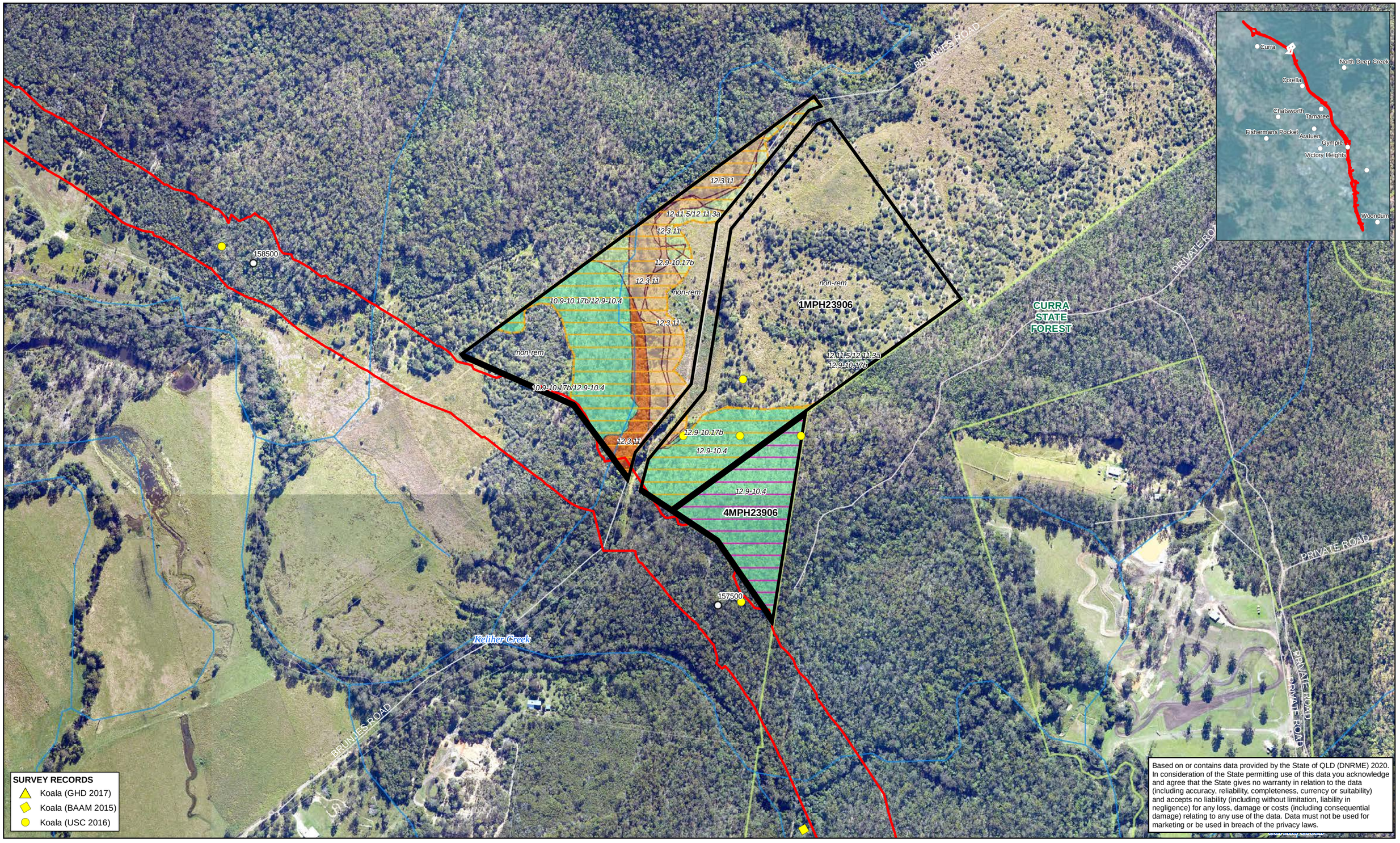

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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- 1km Chainage
- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA4
- K-OA5

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Of Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads
Bruce Highway Cooroy to Curra
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Koala Offset Area K-OA4, K-OA5 Figure 2

1MPH23906 and 4MPH23906

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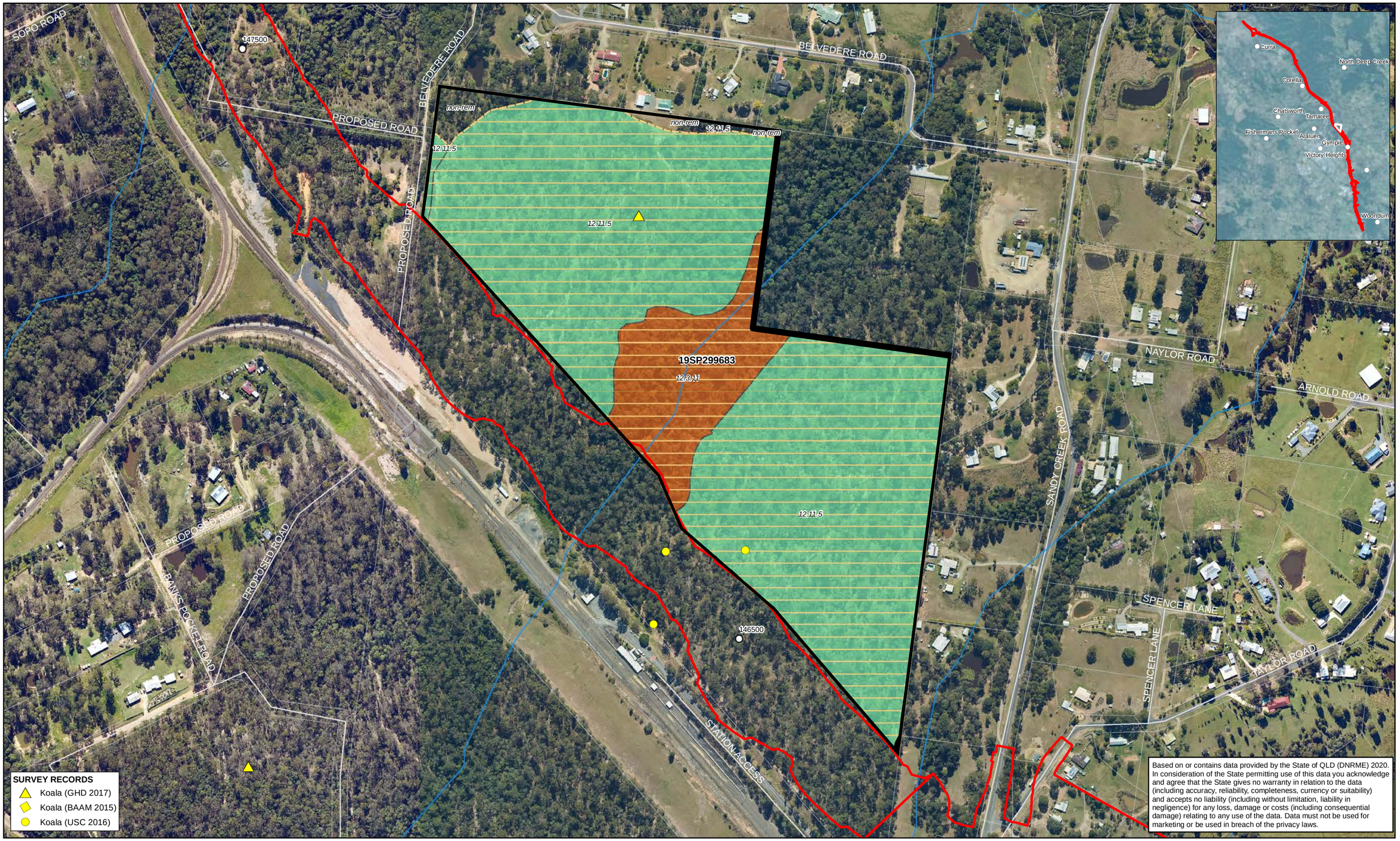

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Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA13

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
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Revision E
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Koala Offset Area K-OA13

19SP299683

Figure 2
Sheet 5 of 9

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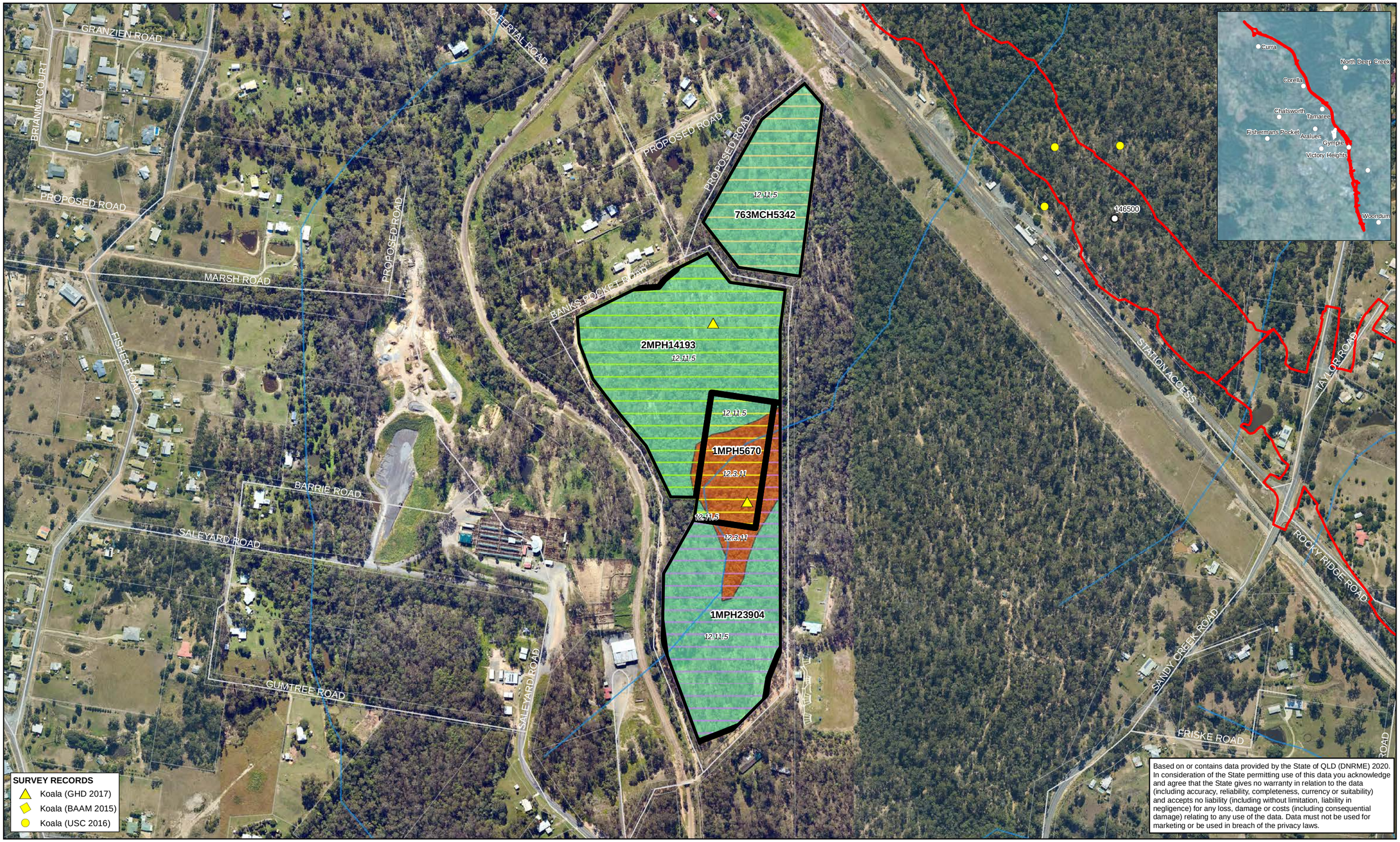

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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA10
- K-OA11
- K-OA12
- K-OA9

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern

Department of Transport and Main Roads
Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

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Date 28 Apr 2020

Koala Offset Area K-OA9 - K-OA12 Figure 2

763MCH5342, 2MPH14193, 1MPH5670 and 1MPH23904 Sheet 6 of 9

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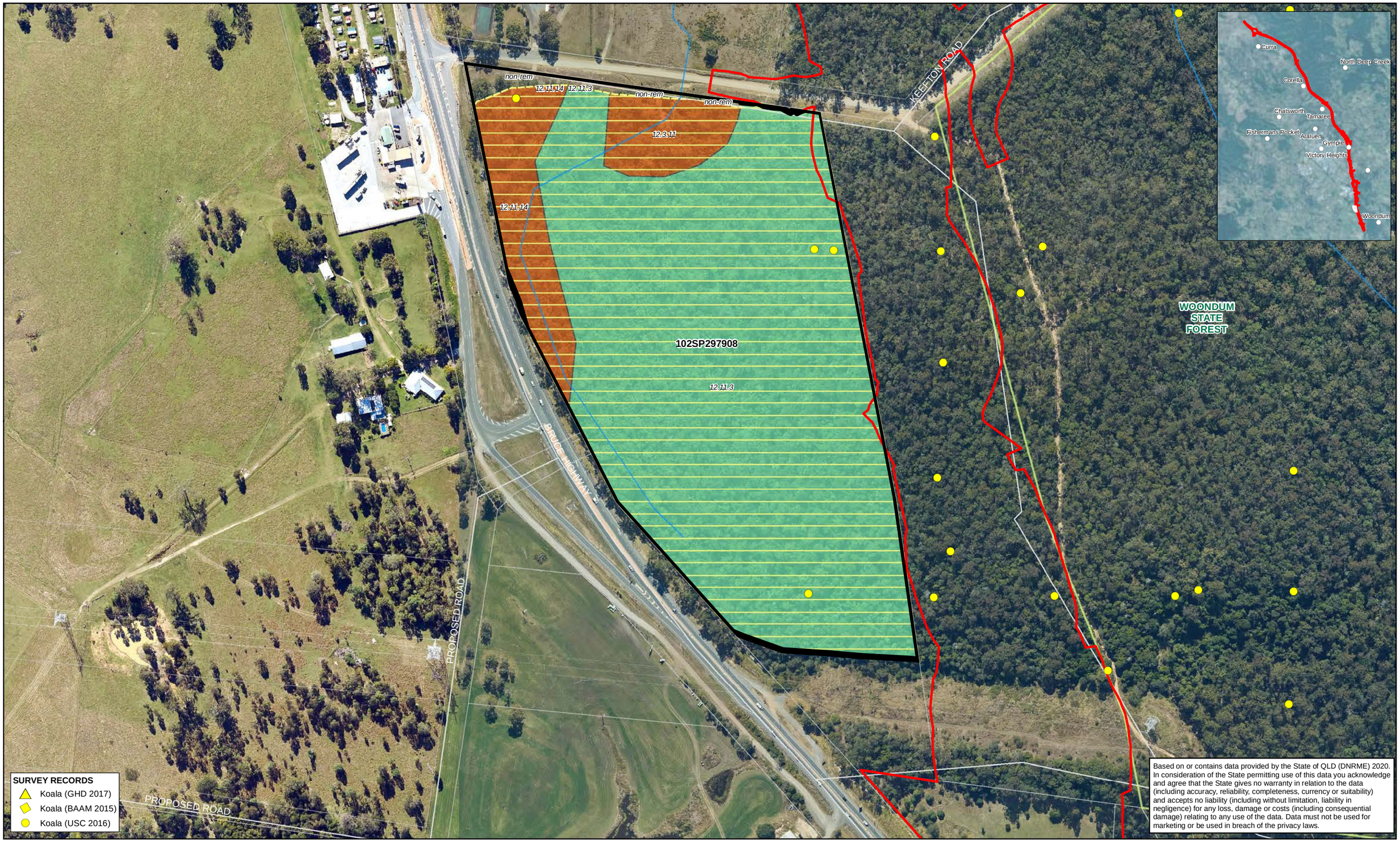
Data source: DNRME: Watercourse (2010), RE v11, Cadastre (2019), Rail (2014), Roads (2016), Towns (2015), Protected Areas (2020); TMR: Chainage (2016), Imagery (2018/2019). GHD: Project Area (December 2016), Koala Records (2017); Ground truthed Regional Ecosystem, Offset Sites (2019/2020). USC/ERM/BAMM: Koala Records (2015/2016). Created by:IHamilton



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Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- K-OA3

Regional Ecosystem

- Remnant Vegetation with Of Concern
- Remnant Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
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Date 28 Apr 2020

Koala Offset Area K-OA3

102SP297908

Figure 2
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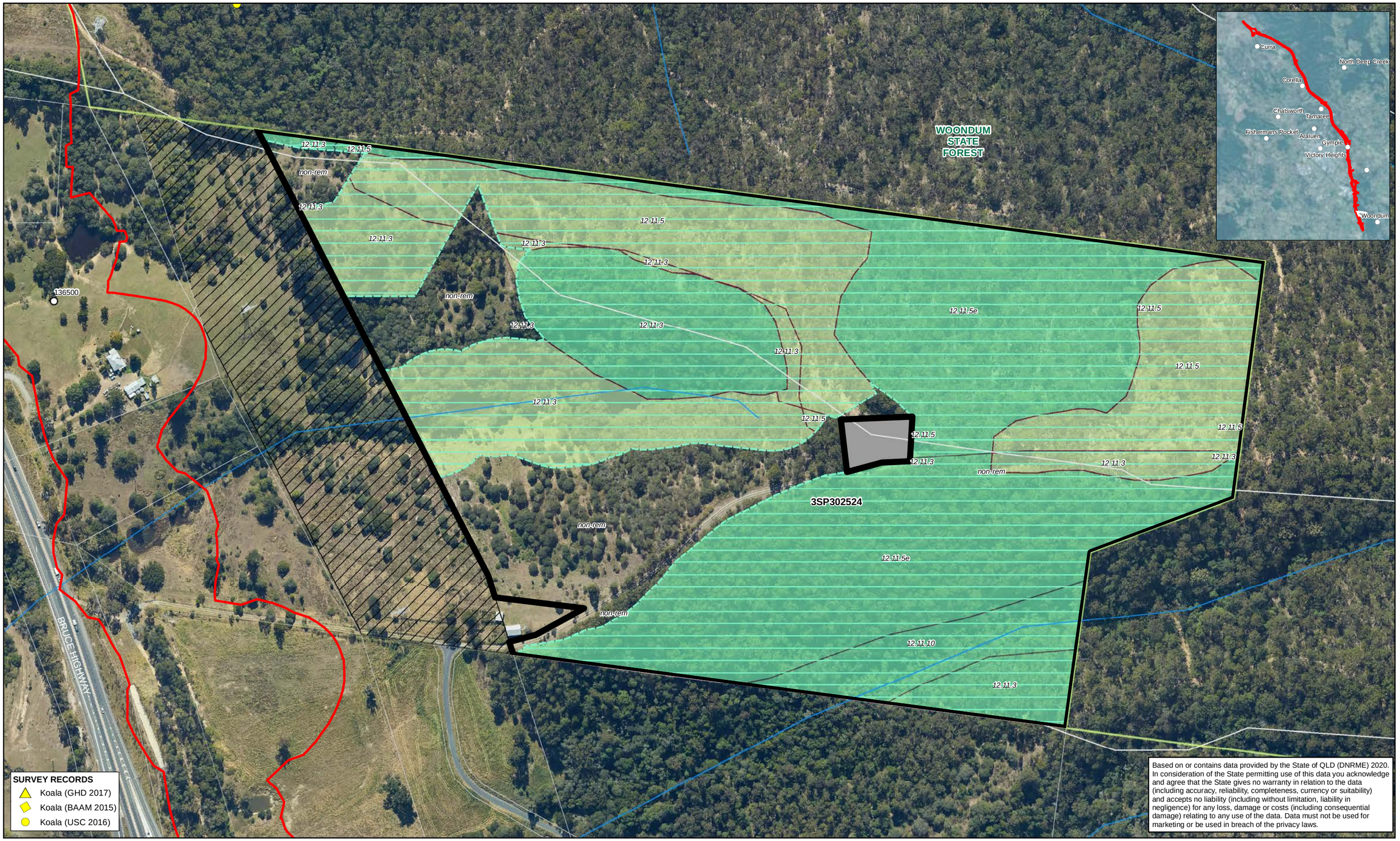

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Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- Easement
- K-OA1
- K-OA2
- Excluded

Regional Ecosystem

- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Koala Offset Area K-OA2

3SP302524

Job Number 41-29914
Revision E
Date 28 Apr 2020

Figure 2
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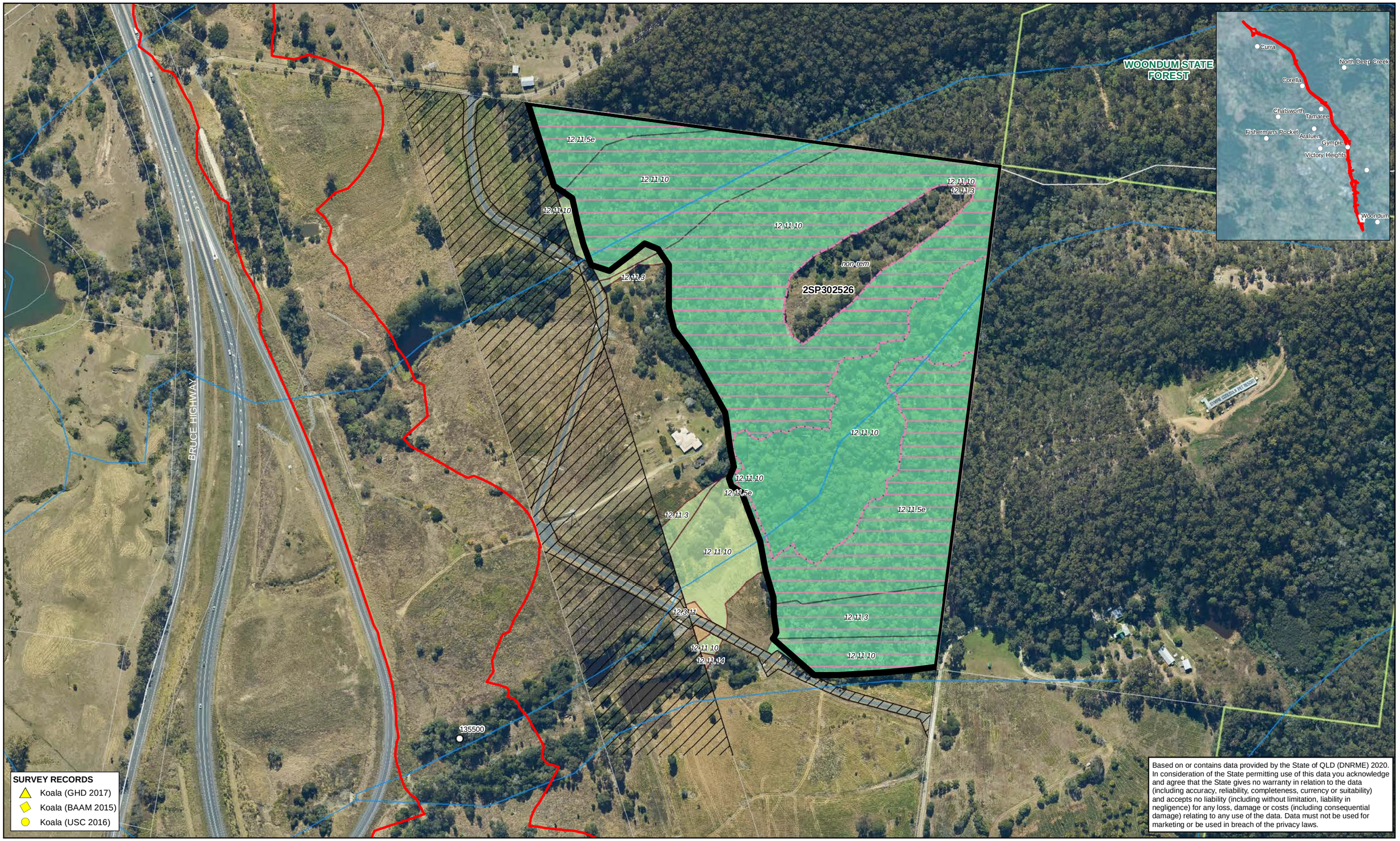

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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- Easement
- K-OA1

Regional Ecosystem

- Remnant Vegetation with Least Concern
- Regrowth Vegetation with Of Concern
- Regrowth Vegetation with Least Concern
- Non-remnant

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Koala Offset Area K-OA1

2SP302526

Job Number 41-29914
Revision E
Date 28 Apr 2020

Figure 2
Sheet 9 of 9

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6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

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Table 4-3 Description of koala offset areas

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
K-OA1 Lot 2 SP302526 Access: Easement north from Woondum Road, Kybong OR potential access track to the north-east corner of this lot from Woondum State Forest, Woondum	11.43	• Remnant eucalypt open forest of RE 12.11.3, 12.11.5e, 12.11.10 (some vine forest) • Food trees present • Koala scratches recorded • Some vegetation connectivity to Woondum State Forest • Koala habitat assessment score of 8	Black-breasted button-quail offset area Lowland Rainforest of Subtropical Australia TEC	Weeds: Dense lantana patches, cat's claw creeper, passionflower vine Other: Previously cleared patch within remnant area, edge effects from adjacent rural residential land, adjacent residence, possible predators, future highway approximately 200 m to west, powerline corridor to west, pet resort to east, past logging, waterway with some channel erosion (stabilised by rocks)	• Area of non-remnant to be rehabilitated (replanted or natural recruitment) • Control weed infestations • Pest fauna control program • Protect from adjacent rural residential use
K-OA2 Lot 3 SP302524 Access: Easement north from Woondum Road, Kybong OR access track to the north-western and eastern boundaries of this lot from Woondum State Forest, Woondum	21.37	• Remnant eucalypt open forest of RE 12.11.3, 12.11.5e, 12.11.10 • Regrowth of RE 12.11.3, 12.11.5e • Food trees present • No direct koala evidence • Directly connected to Woondum State Forest to north and east • Koala habitat assessment score of 8	Black-breasted button-quail offset area Existing population and translocation site for State-listed *Marsdenia coronata*	Weeds: Low weed cover of passionflower vine Other: Edge effects from adjacent rural residential land, existing access track, existing residence, possible predators, future highway and powerline corridor to west, past logging, existing small dams	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Protect from adjacent rural residential use

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
K-OA3 Lot 102 SP297908 Access: Keefton Road and Bruce Highway, Woondum	12.38	• Remnant eucalypt open forest of RE 12.11.3 (rainforest elements in understorey), 12.3.11 and 12.11.14 • Food trees present • Koala scat present • Road corridor will isolate patch from Woondum State Forest to east • Koala habitat assessment score of 9	Black-breasted button-quail offset area	Weeds: Low-moderate lantana, Brazilian nightshade, cocos palm, cadaghi Other: Edge effects from adjacent clearing, possible predators, close to existing and future highway (will be partially isolated between road corridors, including local road to north), powerline corridor to south, past logging	• Area of non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Public access restrictions • Prevent access to adjacent road corridors • Provide connectivity to other habitat areas
K-OA4 Lot 4 MPH23906 Access: Currently Brunjes Road (off Harvey Siding Road), Curra OR proposed via Bradys Road from north-east through Curra State Forest, Curra	3.46	• Remnant eucalypt open forest of RE 12.9-10.4 • Food trees present • Koala scat present • Directly connected to Curra State Forest • Koala habitat assessment score of 9	*Macrozamia pauli-guilielmi*	Weeds: None observed Other: Local access tracks, past logging, adjacent to future highway, possible predators	• Pest fauna control program • Prevent access to adjacent road corridor
K-OA5 Lot 1 MPH23906 Access: Currently Brunjes Road (off Harvey Siding	9.96	• Remnant eucalypt open forest of RE 12.9-10.17b, 12.9-10.4, 12.3.11	*Macrozamia pauli-guilielmi*	Weeds: Lantana Other: Adjacent access tracks, cleared areas, past logging, adjacent to future highway, edge	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
Road), Curra OR proposed via Bradys Road from north-east through Curra State Forest, Curra		• Regrowth of RE 12.9-10.17b, 12.11.5/12.11.3a, 12.3.11 • Food trees present • Koala scat present • Slightly fragmented with some direct connectivity to Curra State Forest • Koala habitat assessment score of 9		effects, possible predators, steep terrain	• Prevent access to adjacent road corridor • Improve connectivity to adjacent habitat areas
K-OA6 Lot 3 MPH23906 Access: Currently Brunjes Road (off Harvey Siding Road), Curra OR proposed via Bradys Road from north-east through Curra State Forest, Curra	19.53	• Remnant eucalypt open forest of RE 12.11.5e, 12.3.11 • Regrowth of RE 12.3.11, 12.11.5/12.11.3a • Food trees present • No direct koala evidence • Directly connected to Curra State Forest • Koala habitat assessment score of 9	*Macrozamia pauli-guilielmi*	Weeds: Lantana, passionflower vine Other: Adjacent access tracks, cleared areas, past logging, edge effects, possible predators, steep terrain	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program
K-OA7 Lot 878 MCH1061 Access: Currently Brunjes Road (off Harvey Siding Road), Curra OR access track to	124.56	• Remnant eucalypt open forest of RE 12.3.11, 12.9-10.4, 12.11.5e • Regrowth of RE 12.9-10.17b • Food trees present • No direct koala evidence	Existing population and translocation site for *Macrozamia pauli-guilielmi*	Weeds: Lantana, passionflower vine Other: Adjacent and internal access tracks, adjacent cleared areas, past fire, past logging, edge effects, cattle, possible predators, some steep terrain	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Prevent access to adjacent road corridor

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
northern corner from Curra State Forest, Curra OR proposed via Bradys Road from north-east through Curra State Forest		• Directly connected to Curra State Forest • Koala habitat assessment score of 9		and rocky gully either side of waterway, minor erosion on tracks	• Improve connectivity to adjacent habitat areas
K-OA8 Lot 889 CP864404 Access: Access track to north-east boundary from Curra State Forest, Curra OR potential access off end of Ashfords Road easement, Curra	33.09	• Remnant eucalypt open forest of RE 12.9-10.17b, 12.3.11, 12.11.5e/12.11.3a • Regrowth of RE 12.9-10.17b, 12.3.11 • Food trees present • No direct koala evidence • Directly connected to Curra State Forest • Koala habitat assessment score of 9	*Macrozamia pauli-guilielmi*	Weeds: Lantana, exotic grasses, passionflower vine Other: Adjacent and internal access tracks, adjacent cleared areas, past logging, edge effects, cattle grazing, stock/horse trampling, possible predators	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Prevent access to adjacent road corridor • Improve connectivity to adjacent habitat areas
K-OA9 Lot 1 MPH23904 Access: Walk in from Banks Pocket Road or road reserve to south of lot, Araluen	5.86	• Remnant eucalypt open forest of RE 12.3.11, 12.11.5e • Food trees present • No direct koala evidence • Connected to moderate-sized patch • Koala habitat assessment score of 6	TBA	Weeds: Prevalent along drainage line Other: Adjacent and internal access tracks, adjacent cleared areas, previous thinning and loss of canopy, past fire, edge effects, possible predators, fragmented landscape	• Control weed infestations • Pest fauna control program • Restrict vehicle access

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
K-OA10 Lot 1 MPH5670 Access: Track from Banks Pocket Road, Araluen through Lot 2MPH14193 (or walk in from Banks Pocket Road), Araluen	2.02	• Remnant eucalypt open forest of RE 12.3.11, 12.11.5e • Food trees present • Koala scat present • Connected to moderate-sized patch • Koala habitat assessment score of 6	TBA	Weeds: Lantana, blue billygoat weed, asparagus fern, cat's claw creeper, ochna, Chinese celtis, camphor laurel, passionflower vine, paspalum; prevalent along drainage line Other: Adjacent and internal access tracks, adjacent cleared areas, some logging, past fire, edge effects, possible predators, fragmented landscape, track erosion on slope	• Control weed infestations • Pest fauna control program • Restrict vehicle access
K-OA11 Lot 2 MPH14193 Access: Track from Banks Pocket Road, Araluen	7.27	• Remnant eucalypt open forest of RE 12.3.11, 12.11.5e • Food trees present • Koala scat present • Connected to moderate-sized patch • Koala habitat assessment score of 6	TBA	Weeds: Low weed cover Other: Adjacent and internal access tracks, adjacent cleared areas, some logging, past fire, edge effects, possible predators, fragmented landscape, track erosion on slope, evidence of recreational vehicle use	• Control weed infestations • Pest fauna control program • Restrict vehicle access
K-OA12 Lot 763 MCH5342 Access: Track from Banks Pocket Road, Araluen	3.58	• Remnant eucalypt open forest of RE 12.11.5 with possible ecotone of 12.11.3 in gully • Food trees present • Koala scratches present	TBA	Weeds: Lantana, passionflower vine Other: Adjacent and internal access tracks, adjacent cleared areas, some logging, past fire, edge effects, possible predators,	• Control weed infestations • Pest fauna control program • Prevent access to adjacent railway corridor • Restrict vehicle access

Offset Area and Property Access	Offset area (ha)	Koala habitat characteristics	Other important habitat values	Known threats/disturbances	Offset management goals
		• Connected to moderate-sized patch • Koala habitat assessment score of 6		fragmented landscape, track erosion on slope	
K-OA13 Lot 19 SP299683 Access: Track from end of Belvedere Road (off Sandy Creek Road), Veteran	26.09	• Remnant eucalypt open forest of RE 12.3.11, 12.11.5e • Regrowth of RE 12.9-10.17b, 12.3.11 • Food trees present • Koala scat present • Small-moderate-sized patch • Koala habitat assessment score of 7	TBA	Weeds: Lantana, cat's claw creeper, blue billygoat weed Other: Adjacent and internal access tracks, adjacent cleared areas, some logging, grazing/horse access, past fire, edge effects, frequent loud noises from gun range, fragmented landscape, railway adjacent, some track erosion	• Control weed infestations • Pest fauna control program • Prevent access to adjacent road and railway corridors • Improve connectivity to adjacent habitat areas • Restrict vehicle access

4.4 Baseline and monitoring surveys

4.4.1 Purpose of surveys

Condition 10 of the EPBC Act approval states that baseline surveys of the koala offset areas must be undertaken by a SQP within six months of legally securing the offset areas. The baseline surveys must include details of:

- The quality of koala habitat, where:
  - Quality is defined in the approval document as a measure, as determined by a suitably qualified person, of site condition, site context and species individual or population persistence or species stocking rate calculated in accordance with the requirements of the EPBC Act offsets assessment guide or other biocondition assessment process agreed by the Department. The assessment process must use a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to baseline data acquired to demonstrate achievement of relevant milestones required in Condition 12.
  - Koala habitat is defined as any vegetation that contains koala food trees and scores five or more using the habitat assessment tool in Table 4 of the Koala referral guidelines.
- Weed infestation:
  - Defined in the approval document as the abundance, composition and distribution of non-native flora species known to restrict the movement or adversely impact on available habitat of the koala across the landscape, as determined by a field survey over the entire koala offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to data acquired to demonstrate achievement of the milestones required under Condition 12.c.
- Koala density:
  - Defined in the approval document as the number and/or utilisation and distribution of koalas per unit area as determined in field surveys over the entire koala offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison).
- Pest abundance:
  - Defined in the approval document as the number, composition and distribution of non-native vertebrate animals known to predate on the koala, as determined in a field survey over the entire koala offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to data acquired to demonstrate achievement of the milestone required under Condition 12.f.

The maintenance and improvement of the koala habitat in the offset areas can then be measured against the baseline data to determine the success of the offset.

The baseline survey will be replicated for scheduled monitoring events.

4.4.2 Survey timing and general limitations

The baseline surveys of all koala offset areas are to be completed within six months of legally securing the offset areas (or as appropriate to peak activity season for target pest fauna species, if advised prior to DAWE).

The use of indirect koala survey methods proposed can be undertaken at any time of year, although detectability may be impacted by factors such as heavy rainfall and flooding and heavy leaf litter.

Patterns of fauna activity, presence-absence data, and estimates of relative abundance of species can be affected temporally by time of day/night, seasonal changes, and yearly changes (as well as those brought about by the impacts of climate change).

There are also detectability errors that arise for certain methods and habitat types, such as detection rates for koala individuals and detection of koala scat within a certain area around the base of a tree. Koala scat and other indirect signs of fauna, such as pest fauna scat, decay over time at a rate depending on the conditions at the site.

Wide-ranging fauna (such as pest species) and highly active/moving fauna may vary results by being absent during the particular survey sampling effort or indicating a higher level of utilisation through their spatial extent of scat and other indirect evidence. Some target pest fauna have peak activity seasons, such as end of winter through to late spring for wild dogs (after pups have whelped) up to late summer for foxes (after cubs have left the den sites), while others are variable throughout the year (such as feral cats and pigs). Some monitoring techniques for pest species may include non-passive measures such as camera traps with lures, which may change the behaviour of some pest species. Additionally for pest species, where active control is being undertaken, behaviour or movement pathways of target species or individuals may alter, thereby potentially altering the results captured at monitoring sites.

Baseline survey and monitoring of pest fauna will be based on best practice techniques and principles in relevant scientific literature. Pest abundance data that relates to numbers of a species relative to the whole species populations will not be captured as part of the proposed methods, however an indicator of estimated numbers (such as an index of activity or detection level) may be used as appropriate to the monitoring methods, due to the size and positioning of the areas to be monitored and the target species to be controlled.

To avoid increased limitations to the surveys:

- All field staff/observers should be trained in the survey method and standards prior to commencing surveys
- Surveys not to be undertaken during inclement weather
- Conditions should be recorded at the time of each survey in a systematic and standardised manner
- Repeat surveys at the same locations wherever possible
- Monitoring locations for pest abundance may be both on and off the offset properties (where possible and suitable) to collect data of long-ranging species activities.

4.4.3 Personnel

The baseline surveys will be conducted by one or more SQPs.

A SQP, as defined in the EPBC Act approval, is a person who has professional qualifications, training, skills and at least three years of relevant experience specific to locating, identifying and conserving the koala. The SQP must be able to give authoritative independent assessment, advice and analysis specific to the koala using the relevant protocols, standards, methods and/or literature. Where the person does not have the appropriate professional qualifications, they must have at least five years of relevant experience specific to the koala.

Detailed survey programs will be designed with input from the SQP and specialist contractors (e.g. pest expert, botanist, revegetation or weed control contractors) in order to capture adequate data and develop effective programs for pest control, revegetation, and weed control. The SQP will be accompanied by specialist contractors during baseline surveys, as appropriate.

4.4.4 Survey methods

The baseline surveys must be undertaken with regard to the best practice guidelines in effect at the time of the surveys:

- The EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) prepared by the Commonwealth of Australia (2014) is the current best practice guideline for surveying koala populations and habitat.
- In Queensland, the Department of Environment and Heritage Protection's Guide to determining terrestrial habitat quality ('the Guide') (EHP, 2017) is a best practice guideline appropriate for determining habitat quality for offset sites.
- The Queensland Herbarium's (Department of Environment and Science) Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (version 3.0, June 2018) provides standards for preparing and conducting fauna surveys.

The baseline surveys will include a combination of direct and indirect survey methods, as described below to satisfy the requirements of Condition 10.

Survey design

The survey team (SQP and any specialist contractors required) shall prepare a detailed survey program that outlines the following:

- Survey effort - number of surveys for each aspect including locations and number of days
- Survey methods, including guidelines and procedures adopted, timing, sample design, details of targeted searches, criteria to be used
- Details of SQP and specialist contractors
- Map of survey sites
- Any relevant proformas and checklists for repeat surveys

The survey program shall be approved by TMR prior to implementation. The survey program should include the below methods and reporting for both baseline and survey events.

Quality of koala habitat

Assessments of koala habitat quality will be undertaken in accordance with the Guide as well as the template provided by the DAWE titled 'Modified QLD Habitat Quality spreadsheet – template' (shown in Appendix D), as relevant, which will include desktop and field assessments as follows:

- Site condition:
  - Condition assessment plots will be permanently established during baseline surveys and used for scheduled biennial monitoring survey events. These will follow the desktop and field assessment requirements and selecting sites/assessment units of the Guide. This condition plot method is further described below.
- Site context:
  - Desktop assessment including the GIS attributes of size of patch, connectedness, contract and ecological corridors from the Guide. These assessments have been undertaken for the offset sites as part of the approval documentation, and are provided for reference in the table in Appendix C.
  - Species habitat index assessment will be undertaken on-site for the attributes of threats to species, species mobility capacity, and role of site location to species overall population in the state in accordance with the Guide.

- Species stocking rate (not assessed using the Guide):
  - Assessment of presence on or adjacent to site, species usage of the site (e.g. dispersal, foraging, breeding), approximate density (per hectare), and role/importance of species population onsite (i.e. key source population for breeding/dispersal, necessary for maintaining genetic diversity, and near the limit of the species range). Note, some of these parameters will be assessed through koala presence surveys described below and will be adapted as relevant to the koala and the site.

The template to be used for deriving and inputting the desktop and field attributes is shown in Appendix D. The 'Modified QLD Habitat Quality spreadsheet – template' refers to the Guide to determining terrestrial habitat quality version 1.2 (dated April 2017), which should be referred to for guidance.

Condition plot

The baseline surveys must be undertaken with regard to the best practice guidelines in effect at the time of the surveys. In order to satisfy the site condition assessment requirements, condition plot assessments will be undertaken that follow the methods within the Guide.

The site condition assessment described in the Guide is derived from the Queensland Herbarium's BioCondition Assessment Manual (Eyre, *et al*., 2015), therefore specific techniques used during condition plots will be undertaken with regard to this manual. The BioCondition Assessment Manual provides an assessment protocol that gives a measure of how well an area of vegetation is functioning for the maintenance of biodiversity values, with a condition score that is comparable between and within ecosystems over space and time.

The plot will be permanently marked on site with markers (e.g. labelled pickets in ground) at the 0 m, 50 m and 100 m centre points. Photo monitoring points are taken at the 50 m point along and perpendicular to the centreline to provide a record of structure and general condition of the area. In accordance with the BioCondition Assessment Manual, baseline surveys within the plot will include recording of:

- Number of large native trees
- Recruitment of woody perennial species – the proportion of ecologically dominant layer species regenerating (<5 cm diameter at breast height (DBH))
- Native tree canopy height and cover
- Native shrub (<2 m) canopy cover
- Native tree species richness
- Native plant species richness (shrubs, forbs, grasses)
- Non-native plant cover
- Coarse woody debris
- Native perennial grass cover
- Organic litter

A score will be attributed to each site, which can be compared to a benchmark for that RE (i.e. the median or average characteristics of a mature and relatively undisturbed ecosystem of the same type), or reference site if no benchmark exists as well as compared over time. BioCondition site data will be compared with the relevant benchmark (draft or published), values from the RE technical description and/or similar RE benchmark data, or a reference site undertaken at the time of the baseline surveys.

Specific attribute scores that are below the benchmark data can be highlighted for potential management improvements.

The BioCondition Site Assessment Datasheet is included as Appendix B. If a reference site is required, the Method for the Establishment and Survey of Reference Sites for BioCondition (Eyre *et al.,* 2017) should be followed using the BioCondition Reference Datasheet.

Weed infestation

Baseline surveys will identify weed infestations to be targeted during the weed control program, incorporating the abundance, composition and distribution of non-native flora species known to restrict the movement or adversely impact on available habitat of the koala across the landscape. Surveys will describe (as a minimum):

- Target species present
- GPS locations of individuals or patches, as appropriate
- General rating of abundance (e.g. classes from Queensland Annual Pest Distribution Survey of: occasional and localised, occasional and widespread, common and localised, common and widespread, abundant and localised, abundant and widespread)
- Extent of infestation represented by an estimate of cover in sample quadrats (e.g. 10 permanent quadrats per offset site of 10x10m with visual assessment of percentage density/cover or number of stems/area, as appropriate to the growth form)

Weed species that should be considered for targeting within the koala offset areas, if present and dependent on the extent and positioning of the infestation (based on potential weed threats described in the NSW Koala Recovery Plan (DECC, 2008), Gympie Regional Council's Koala Conservation Management Plan 2018 and Gympie Region Biosecurity Plan), include:

- Camphor laurel (*Cinnamomum camphora*)
- Cat"s claw creeper (*Dolichandra unguis-cati*)
- Chinese Celtis (*Celtis sinensis*)
- Climbing asparagus (*Asparagus plumosus*)
- Lantana (*Lantana camara*)
- Madeira vine (*Anredera cordifolia*)
- Morning glory (*Ipomoea spp*.)
- Prickly pears (*Opuntia spp*.)

Koala density

Aerial drone surveys and/or dog detection surveys will be undertaken to detect direct and indirect evidence of koala presence, in order to estimate koala density or utilisation.

The aerial drone surveys will involve the use of thermal imaging with field verification techniques over the koala offset areas.

Where dog detection surveys are used to supplement the drone surveys of koala presence, these will follow the survey protocol of the Koala Rapid Assessment Method (KRAM) (Woosnam-Merchez *et al*. 2012). These surveys will be undertaken by qualified and experienced scientists using highly trained koala detection dogs. This method has been shown to be >150% more accurate in koala scat detection and 20 time more efficient than person-only surveys (Cristescu *et al.* 2015), therefore better able to cover the large areas of the offset sites. Random sampling locations will be selected with rapid assessment sites undertaken at each sampling location. The number of trees with koala scats present will be recorded (out of a total number of trees searched), with information captured on the age class and size of scats. Photographs of the sampling location vegetation structure and scats found will be taken. Any koala individuals observed at the time of survey will also be recorded.

The findings of the koala presence surveys will be provided, along with GIS data of sampling locations and records.

Koala presence surveys will be undertaken at the baseline survey event, and within 5 and 10 years (unless outcomes are demonstrated earlier and negotiated with DAWE as completed) of the baseline surveys, in order to provide an indication of the progress towards the ecological outcome of a 50% increase in koala utilisation or koala density across the koala offset areas.

Habitat assessments will also be undertaken to record other indirect signs, such as koala scratches on smooth-barked trees, a general description of habitat type and vegetation structure, landscape context, and any other habitat features present.

Pest abundance

Baseline surveys will be undertaken to determine levels of pest abundance (defined for the purpose of this OMP as the number, composition and distribution of non-native vertebrate animals known to predate on the koala). Data will be gathered on the pest species present, detection/activity levels, and distribution relative to the offset areas only. Pest control will target wild dogs however other potential predators will be also be surveyed and monitored using the same methods, such as domestic dogs, feral cats and foxes.

The baseline surveys will systematically collect data in a scientific and repeatable manner by a team consisting of an SQP for koalas and pest fauna specialists. The baseline surveys will include the following:

- A desktop assessment to determine appropriate/likely habitat areas and movement corridors (using aerial imagery overlays and available data), such as along roads, tracks, creeks, cleared easements or firebreaks, and fence lines. The overall assessment area will encompass a 5 km radius of the offset sites, to cover realistic wild dog and other pest fauna ranges. An initial site reconnaissance may also be undertaken to identify landscape features and suitable locations for monitoring equipment.
- Transects (locations based on the desktop assessments) will be established and undertaken for collection of indirect observation data, providing evidence of the presence of pest species. Indirect evidence would be obtained from predator scats, diggings, den sites, and tracks. Sand plots may be established to assist with collection of track/movement data in suitable locations. Detection dog searches may be utilised to identify dens and regular predator use pathways.
- Infra-red motion-sensor cameras will be positioned in suitable locations within the offset sites and used to passively (no lure) or actively (with lure) monitor quantitative pest abundance (verified species and numbers). Camera trap survey design (placement, spacing and duration) will follow guidelines set out in the NSW Department of Primary Industries' An introduction to camera trapping for wildlife surveys in Australia (2012), including:
  - Camera traps will be in place for minimum of 14 nights and, ideally, up to four weeks. Due to known long-ranging rotational movements of wild dogs, in particular, in the area, the longer the monitoring period the better.
  - Camera monitoring locations will be a minimum of 1 km apart (if on a lineal pathway) and placed in the most suitable locations for detecting pest presence/movements. These sites are likely to overlap with the indirect evidence observation monitoring locations.
  - All camera trap locations will be marked with GPS and images collected will be date/time stamped. A suitable coding, storing, and sorting program will be used to ensure image data can be collated and compared in a manner to produce scientifically meaningful data.

Baseline surveys for target pest fauna may need to be undertaken during the peak activity season for that species (e.g. after winter for wild dogs).

The data collected during the baseline surveys will be used to provide information on pest fauna species present, predator activity/detection levels (as an estimate of numbers present), and estimates of distribution across the offset sites, which can then be compared over time.

Baseline surveys of the offset sites will also assist in identifying any regular movement corridors and 'hot spots' that may be able to be targeted during pest control surveillance and actions. This information will be used to assist in the design of the pest control program on and surrounding the offset sites.

Where possible, monitoring locations on the offset sites will remain consistent for the duration of the required monitoring and control programs. Where 'hot spots' of pest activity are identified elsewhere through opportunistic observations or control work, changes to monitoring locations may be required, provided that the scientific rigor of the data is not impacted. Monitoring will be undertaken annually for a minimum of 10 years (in addition to pest control surveillance locations to be set up as part of the pest control program).

General site features

Additional site features to be located and recorded during baseline surveys include:

- Location of fences or other infrastructure to be removed, replaced or repaired
- Cleared areas that could be used for replanting, including site characteristics such as soil type, landform, extent and cover of existing koala food tree species (species of the genera *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* that are known to be consumed by the koala and are greater than 4 m height or with a trunk circumference greater than 31.5 cm at 1.3 m above the ground), mapped extent of areas, weed species, other existing disturbances
- Disturbed or regrowth areas that could be used for natural regeneration/recruitment, including type, extent and estimate of cover or abundance of koala food tree species (as per above definition) and heights/size ranges, mapped extent of areas, weed species, other existing disturbances
- Locations of access tracks
- Locations of fire breaks and evidence of past fires
- Presence of waste to be removed
- Evidence of erosion that requires remediation
- Evidence of past and current land use, access and other human activities (e.g. logging, recreational vehicle access, stock grazing)
- Natural disturbances such as tree falls, dieback due to drought, flood or other natural disaster
- Any other threats or degradation of the land and habitat
- Photos of recorded features and at permanent photo monitoring points
- Locations of permanent photo monitoring points

Features recorded are to be shown on maps, if relevant to management or maintenance.

Scheduled monitoring survey

The above baseline elements will be monitored biennially (Years 1, 3 and 5) after the baseline survey event for the first five years after legally securing, or every five years where specified (except for the pest abundance survey, which is further described below).

The following aspects of active management areas will also be monitored biennially to assess the offset areas progress towards the ecological outcomes (as set out in Section 4.5.1):

- Revegetation areas: Representative sample sites to provide general observations of plantings such as number koala food tree species and tubestock planted, height ranges, condition/health, evidence of plant damage or mortality, evidence of reproduction (fruiting/seed dispersal) or seedling recruitment, evidence of pests or plant pathogens, weed introductions or spread, need for particular maintenance actions (e.g. increased watering, weeding, mulch, tree guards), new threats or disturbances
- Targeted naturally regenerating areas: Representative sample sites to assess koala food tree recruitment (species and estimated cover/abundance of trees of the genera *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* known to be consumed by the koala that are greater than 4 m height or with circumference more than 31.5 cm at 1.3 m above the ground), extent of areas, evidence of disturbances such as weeds infestations
- Weed management areas: Representative sample sites will be assessed across the offset areas to estimate cover and extent for targeted weed infestations, observations of new weed infestations of target species, additional disturbances or land degradation, evidence of native recruitment where weeds have been removed, evidence of maintained vine understorey in areas subject to staged replacement of lantana with native understorey species within black-breasted button-quail habitat, evidence of successful treatment methods, additional required maintenance of weed infestations
- Land use and access management areas: Evidence of increased disturbance or recovery where natural or non-natural disturbances have been previously identified; effectiveness of remediation measures (e.g. erosion control); maintenance requirements for fences or access tracks
- Capture of photographs at permanent monitoring points and to demonstrate changes to any of the above features or active management areas

The above elements can be captured in the form of a checklist/table proforma for ease of use and repeatability.

The scheduled monitoring event is additional to prescribed inspection and maintenance schedules for the planting, weed control or pest control programs (to be developed, as outlined in Section 5.5).

The monitoring data (including baseline elements) will be collected biennially (Years 1, 3 and 5) from the time of the baseline surveys until approximately 5 years after the baseline survey. If ecological outcomes are demonstrated to be achieved at the 5 year monitoring event, completion data will be provided to demonstrate compliance with completion criteria, and will be negotiated as completed with DAWE.

If further monitoring is required to demonstrate completion of ecological outcomes:

- Planting areas and natural regeneration areas will be monitored at 10 years to demonstrate an increase of 20% koala food tree recruitment
- Targeted and representative weed infestations will be monitored at 10 years to demonstrate a 90% reduction
- Additional koala presence surveys will be undertaken at 10 years to demonstrate a 50% increase in koala density/utilisation

Pest abundance

Pest fauna species, detection/activity levels and locations recorded across the offset areas will be monitored annually as part of the pest control program to demonstrate a reduction over 10 years when compared to baseline data. The baseline surveys will be replicated at offset sites using camera traps, indirect evidence transects, sand plot locations and/or dog detection for den sites. Where possible, monitoring locations will be the same as for baseline, however where ‘hot spots’ of pest activity are identified elsewhere through opportunistic observations or control work, changes to monitoring

locations may be required, provided that the scientific rigor of the data is not impacted. Monitoring locations both on and off the offset properties may be utilised where possible and suitable.

4.4.5 Reporting

Update of OMP

Following baseline surveys, the following sections of this OMP can be updated:

- Figures showing types and locations of features to be targeted for management, as advised by the SQP with the aim of achieving the ecological outcomes (including weed infestations to be targeted, areas to be revegetated/regenerated, access restrictions, infrastructure such as fences and tracks to be maintained or removed, disturbances/threats to be managed, additional records or sightings)
- Update of management measures as appropriate and for site-specific requirements
- Review register (as relevant to the updated sections)

Baseline and monitoring survey report

A baseline survey report will be provided/published within one year of legally securing the offset areas. Monitoring reports will be prepared following scheduled monitoring events.

The report shall include:

- Results of site condition plots, site context analysis, fauna species index assessments and species stocking rate elements
  - The site condition, site context and species stocking rate inputs will be added to the template (shown in Appendix D) in order to obtain habitat quality scores for each assessment unit/site and offset area. These habitat quality scores will be updated and reported after each scheduled monitoring event.
- Weed infestations to be targeted, estimated cover and locations across the offset areas
  - The baseline survey report will provide the species, percentage cover/density or stems/area and rating of abundance, and offset sites they occur on for non-native flora species known to restrict the movement or adversely impact on available habitat of the koala (from representative quadrat sites across the offset areas). Other non-native species will be recorded for future reference and as an indication of site condition and composition overall, however may not require targeted control measures.
- Results of koala presence surveys and field verification, and general habitat assessments
  - Koala density/hectare or utilisation rates (as described by Phillips and Callaghan, 2011) will be used to indicate the abundance and distribution of koalas across the offset areas. Where aerial drone surveys are conducted, individual koalas detected can provide a density/hectare estimate. Where dog detection surveys are used to supplement the aerial drone surveys, activity levels or utilisation is determined for each rapid assessment site by using the number of trees under which scats are found, divided by the total number of trees searched per site.
- Pest species present, numbers and locations recorded
  - To be able to demonstrate a reduction in pest abundance (i.e. the number, species and distribution) of target pest fauna, data gathered using camera trap, indirect observation transects and sand plot sites will be analysed to identify predator species present, activity/detection levels (as an estimate of numbers present), and locations recorded (estimated distribution) across the offset sites, which can then be compared over time.
  - Results of the pest control program and associated surveillance sites will also provide evidence of reduction in pest numbers in or surrounding the offset sites, as well as movement pathways, den sites and potentially individuals removed that can be identified using camera trap images.

- Areas, disturbances and introduced species distributions to be targeted for active management to meet the ecological outcomes, including areas designated for planting and natural regeneration of koala food trees and conditions and changes to the extent and cover of these areas

Figures will be prepared to show baseline/monitoring site locations, additional koala records (direct and indirect), targeted weed infestations, evidence of pests, and proposed and continuing active management areas for weeds, replanting and natural recruitment.

The baseline report will also describe the following elements (or refer to relevant sections of this OMP as an attachment):

- Key performance indicators and completion criteria for evaluating the success of the management measures
- Criteria for triggering corrective action
- A program with a timeline to monitor (capable of timely detection of triggers for corrective action) and report on the effectiveness of the management measures, and progress against the performance and completion criteria
- Remediation measures to be implemented where monitoring of the performance criteria indicate failure to achieve the ecological outcomes
- Potential risks to the successful implementation of the management measures and a description of the control measures that would be implemented to mitigate against these risks and residual risk ratings

Monitoring data will be prepared with regard to the DAWE's Guidelines for biological survey and mapped data (2018).

Annual compliance report

The results of baseline and monitoring surveys will be included in the annual compliance reports, as relevant to that year. Baseline data will be compared with monitoring data to demonstrate changes in offset area habitat quality scores and for identifying progress of management actions towards the performance indicators and completion criteria.

Results of the weed control program, pest control program and replanting program will be included in the annual compliance report, as relevant, including control and maintenance activities undertaken on-site and follow-up treatments/monitoring conducted.

4.5 Offset delivery

4.5.1 Ecological Outcomes

For the koala offset areas, the aim of this OMP is to achieve the following ecological outcomes for the duration of the approval:

- For the duration of the approval, ensure no net loss in the quality and extent of koala habitat within the koala offset areas compared to the baseline survey data
- Within 15 years of baseline surveys of the koala offset areas, the approval holder must demonstrate a 20% increase in koala food tree recruitment over the entire koala offset areas compared to the baseline survey results
- Demonstrate the following reductions in weed infestation compared to the baseline data:
  - 50% reduction within 3 years of baseline surveys of the koala offset areas
  - 90% reduction within 10 years of baseline surveys of the koala offset areas
- Within 15 years of baseline surveys of the koala offset areas, demonstrate that an increase of at least 50% of koala density/utilisation has been achieved across the entire koala offset areas compared to the baseline data
- Demonstrate a reduction, maintained for 10 consecutive years from baseline surveys of the koala offset areas, in pest abundance compared to the baseline data

4.5.2 Performance indicators and completion criteria

To determine progress towards the ecological outcomes, compared to the baseline data collected, and to determine completion of the offset, the koala offset areas will be measured against the performance indicators and completion criteria shown in Table 4-4.

Table 4-4 Performance indicators and completion criteria for koala offset areas

Ecological outcome	Performance Indicator 1	Performance Indicator 2	Completion criteria
No net loss in the quality and extent of koala habitat	• Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent	• Within 5 years of baseline survey, habitat quality and extent has been maintained across the koala offset areas	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), habitat quality and extent has been maintained across the koala offset areas
Demonstrate a 20% increase in koala food tree recruitment over the entire koala offset areas	• Within 12 months of baseline survey, develop and implement an ongoing koala food tree replanting program AND identify areas suitable for natural recruitment of koala food trees, over a minimum of 57 ha	• Within 5 years, demonstrate a 20% increase (by area) in koala food trees OR • Replanted areas do not require further direct maintenance (they are established/ surviving independently) AND demonstrate evidence of natural recruitment	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), there is an increase in koala food trees by 20% (by area) over the entire koala offset areas

Ecological outcome	Performance Indicator 1	Performance Indicator 2	Completion criteria
		of koala food trees occurring outside of replanted areas	
Targeted weed infestations have been reduced	• Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations	• Within 5 years, demonstrate a 90% reduction in targeted weed infestations OR • Additional identified weed infestations have been treated	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), there is a 90% reduction in targeted weed infestations
Demonstrate an increase of at least 50% of koala density/ utilisation	• Within six months of legally securing, undertake a koala presence survey to indicate baseline koala density/ utilisation	• Within 5 years of baseline survey, demonstrate a 50% increase in koala density/utilisation	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), demonstrate a 50% increase of koala density/utilisation across the koala offset areas
Demonstrate a reduction in pest abundance for 10 consecutive years	• Within 12 months of legally securing, develop and implement a pest control program	• Within 5 years of baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data	• Within 10 years of baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data

It is noted that the occurrence of baseline surveys and subsequent monitoring surveys may be amended following approval of legal securing, so that timing of events are comparable across years to demonstrate the condition of the sites and changes that have occurred.

The following sections outline management actions, maintenance activities, monitoring programs, reporting and triggers for remedial action that may be implemented to achieve these outcomes (to be advised by SQP following baseline survey).

4.5.3 Revegetation and regeneration management

Within 12 months of legally securing the koala offset areas, an ongoing koala food tree replanting program will commence. The replanting program will be undertaken by a SQP and will include measures to ensure the maintenance and survival of new koala food trees in the koala offset areas. Within 15 years of legally securing the Koala offset areas (or earlier if demonstrated and negotiated with DAWE), a 20% increase in koala food tree recruitment over the entire koala offset areas, compared to the baseline survey results, must be demonstrated.

This program will also assist in achieving the ecological outcomes of no net loss in the quality and extent of koala habitat and an increase of at least 50% of koala density/utilisation achieved within 15 years.

During baseline surveys (refer to Section 4.4), the following data will be recorded:

- Locations, extent and characteristics of disturbed or cleared areas to be revegetated within the koala offset areas
- Locations, extent and characteristics of regrowth or disturbed areas to be managed for natural regeneration of koala food trees, including existing extent of koala food trees
- Existing threats and disturbances, including weed infestations, rubbish, land degradation, land use and access

Following the collection of baseline data, a planting program will be designed for areas where disturbances occur within the koala offset sites. The species selected will be site-specific and dependent on localised habitat features and landforms (e.g. waterways, steepness of slope, soil type), with a focus on locally endemic koala food tree species of the genera *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca*.

Revegetation and regeneration works should be undertaken with regard to the South East Queensland Ecological Restoration Framework (Chenoweth EPLA and Bushland Restoration Services, 2012).

Site establishment and planting will be scheduled within the first year of the offset commencing, with a monitoring and maintenance schedule implemented to provide adequate watering, weed control and replacement of stock, as necessary.

Suitable areas to be targeted for natural regeneration will contain existing juvenile (and potentially some non-juvenile) koala food trees. Management of these areas will focus on controlling weeds and restricting access from vehicles or stock animals, or other existing significant disturbances, in order to promote further growth and new seedlings.

Revegetation will also be undertaken within K-OA1, K-OA2 and K-OA3 offset areas for the black-breasted button-quail habitat. A program of gradual, staged replacement of lantana thicket with native vine understorey will be implemented at these sites (rather than immediately treating all lantana infestations) in order to maintain and replace habitat for the black-breasted button-quail habitat.

The revegetation and natural regeneration management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 4-5, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 4-5 Revegetation and regeneration management – koala offset areas

Revegetation and regeneration management
Ecological outcomes
-Demonstrate a 20% increase in koala food tree recruitment over the entire koala offset areas -No net loss in the quality and extent of koala habitat -An increase of at least 50% of koala density/utilisation has been achieved
Management measures
-All works to be undertaken under direction of a SQP with appropriate qualifications and certifications in accordance with appropriate guidelines and standard methods, as relevant. -Results of baseline surveys to be used to identify revegetation areas and natural regeneration areas where there are opportunities within cleared or disturbed/regrowth areas on the same lots adjacent to the koala offset areas. A minimum of 57 ha must be replanted and/or managed for natural regeneration. Areas to be planted should be located in relatively accessible locations or close to existing access tracks to enable maintenance activities to be undertaken. -A planting program will be developed by an experienced and qualified revegetation specialist contractor that uses site-specific information from baseline surveys to locate planting areas, select koala food tree species, describe site establishment and planting methods, and provide an inspection and maintenance schedule for watering, weeding and stock replacement, if necessary. The planting program must consider landforms such as disturbed watercourses in the planting locations and species selection. The planting program is to describe spacing/density for koala food trees and overall numbers of each species to be sourced and planted in the planting areas, consistent with the existing vegetation community and local environment -Access to planting areas to follow existing vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within existing koala habitat. Vehicle access may occur through or along the edges of cleared or regrowth areas. -Planting must commence within one year of legally securing the offset areas. -Where major weed infestations or other significant disturbances occur, treatment or removal of the disturbance and other site preparations (such as establishing access, removing or repairing fences, soil preparation) will commence prior to one year of legally securing the offset areas in order to allow for immediate replanting or natural regeneration of these areas with native species, as appropriate. Refer to weed management measures in Section 4.5.4 and land use and access management in Section 4.5.6 for additional information. -Staged replacement of lantana infestations within the K-OA1, K-OA2 and K-OA3 offset areas that are also black-breasted button-quail habitat areas will be undertaken using appropriate native vine understorey species to maintain and replace habitat values for the black-breasted button-quail while still providing for movement of the koala. A method for this staged replacement will be included in the planting program (and is discussed further in Section 6.5 weed management for black-breasted button-quail offset area). Isolated individuals of lantana would not require replacement with native vine species where the surrounding vegetation structure is koala habitat (e.g. eucalypt open forest with sparse understorey and ground cover. -Selection of species for plantings will be based on results of baseline surveys and current and pre-clear RE mapping for the site, using locally endemic koala food tree species (of the genera *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* known to be consumed by koalas) where tubestock are available. Species selection and placement will be dependent on local landforms, habitat features and other site characteristics (e.g. waterways, steepness of slopes, geology and soil type).

Revegetation and regeneration management

- Replanted areas should be of a density that will eventually achieve a vegetation structure and canopy/subcanopy tree spacing similar to that of surrounding koala habitat (open eucalypt forest), allowing for a potential loss of up to 20% of plantings.
- Tubestock shall be from locally or regionally sourced seeds, where available, with no evidence of poor condition, growth or root systems.
- Immediately prior to and following planting, an inspection and maintenance schedule shall be implemented to provide adequate watering, weed control and replacement of stock, as necessary.
- Tubestock and planting holes to be watered prior to and immediately after planting, with ongoing watering maintenance to be scheduled in the planting program
- The following watering program is to be implemented, with consideration of prevalent conditions and recent or forecast rainfall:
    - Watering immediately prior to and post planting (as specified above)
    - Once per week for up to three months (two months if wet conditions; three months if dry conditions)
    - Increased frequency or total duration may be required if heatwave or prolonged dry conditions experienced
- Mulch and/or tree guards to be installed if required for the species, location, existing fauna or exposure (to be specified in the planting program). Tree guards to be removed after plants established
- Inspections and maintenance (i.e. direct applications such as watering, mulch, pesticide, fertiliser) to be scheduled (at a minimum):
    - Monthly for the first six months after planting
    - Every three months between six and 12 months after planting
    - Every six months in the second and third year after planting
- Inspections and maintenance will include assessment of survival with plant replacement to occur where >20% mortality of plantings experienced and to achieve a minimum area of 57 ha of koala food trees planted/regenerated. Species selection is to be reviewed/modified if continued failure is observed in one or more species. Any wide gaps in planted areas (e.g. greater than three canopy widths) due to plant mortality must be investigated, ameliorated and replanted. Survival rate will be monitored at the following frequencies (can be undertaken in conjunction with scheduled inspections):
    - Every six months in the three years after planting
- Areas to be planted or naturally regenerated will require inspections and follow-up maintenance activities if initial weed treatment or removal of other disturbances has been undertaken. Inspections and maintenance for weed treatment or other disturbance can be found in the weed management measures in Section 4.5.4 and land use and access management in Section 4.5.6.
- Inspection and maintenance activities (or other works) shall be recorded on a checklist, including details of plant replacement and general observations of plant health and growth, weed introduction or spread, seedling recruitment, evidence of insect damage or plant pathogens, evidence of additional disturbance, threats or land degradation, general site observations, weather records.
- Minor clearing or disturbance of native vegetation within or adjacent to the planting or regeneration areas may be required to enable access to planting areas, for site establishment or to maintain fences, firebreaks, access tracks or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist.
- Photographs and GPS data to be taken during site preparation, planting, weed treatment, inspection and maintenance works
- Contractor to notify TMR of any major works (e.g. clearing for new infrastructure or tracks) prior to undertaking

Revegetation and regeneration management			
-Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the koala), or non-compliance (of management actions or conditions of approval) occurs			
Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP with site-specific information Modification of management actions or monitoring program if necessary
Survival rate	Every six months for three years after planting	>20% loss of plantings	Investigate and address (if possible) cause of mortality, if evident (e.g. drought conditions, stock trampling, vehicle access). Replacement of plants in same manner as initial plantings and maintenance Review species selection or planting methods if failure occurring in one or more species Increase frequency of maintenance and inspections, if required Replacement of plants if significant gaps between trees due to plant mortality
Inspections and maintenance of plantings will be recorded (checklist)	Monthly for the first six months after planting Then every three months up to one year after planting Then every six months in the second and third year after planting	Reduced condition or health of plantings Weed introduction or spread Evidence of pests or plant pathogens on new plantings Additional disturbances	Potential to increase frequency of inspections and maintenance for a period of one year Conduct weed treatment, as appropriate Apply pesticide or other treatment as appropriate to pest/pathogen, having regard to any sensitive habitats present Take action to remove additional disturbance and prevent further disturbances, as appropriate
Scheduled monitoring event (in accordance with baseline and monitoring survey program in Section 4.4)	Years 1, 3 and 5 for up to 5 years after baseline survey If outcomes not demonstrated at 5 years, an additional monitoring event will be scheduled at 10 years.	Reduction in koala habitat quality or extent Additional threats requiring management action No evidence of koala presence in replanted or regenerating areas.	Review weed and pest fauna control programs, and land use activities and management, and increase control measures if required Management of additional threats observed Increase plantings to improve movement corridors Consider the need for additional koala presence surveys to demonstrate outcomes

Revegetation and regeneration management			
		No increase in koala presence across the koala offset areas.	Undertake additional active management beyond five years if required to meet or maintain completion criteria Review/increase frequency of monitoring events if progress towards performance or completion criteria is not demonstrated Amend OMP as relevant
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within six months of legally securing, undertake a koala survey to indicate baseline koala density/utilisation	Results included in baseline report	At the six month milestone if the koala presence survey has been undertaken, project can progress as scheduled.	Undertake koala presence survey event as soon as possible. Implement process to ensure future monitoring events are undertaken on schedule.
Within 12 months of baseline surveys, develop and implement an ongoing koala food tree replanting program AND identify areas suitable for natural recruitment of koala food trees, over a minimum of 57 ha	Compliance report to identify areas and activities commenced and ongoing program details	At the 12 month milestone if the koala food tree replanting program has been commenced and areas identified for natural recruitment, project can progress as scheduled.	If koala food tree replanting program has not commenced within 12 months of baseline surveys, commence as soon as possible. DAWE is to be notified accordingly. Ensure activities are carried out in a manner that enables offset area management timelines to be maintained.
Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent	Monitoring/compliance report to compare against baseline data and determine progress towards criteria	At the 12 month milestone, if monitoring program has been implemented, project can progress as scheduled.	If monitoring program has not been developed or implemented within 12 months of baseline survey, undertake monitoring event as soon as possible. Implement process to ensure future monitoring events are undertaken on schedule. DAWE is to be notified accordingly.
Within 5 years, habitat quality and extent has been maintained across the koala offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if habitat quality and extent is the same or better than baseline data across the offset areas, completion criteria has been met (if demonstrated	If habitat quality or extent has reduced, site-specific details should be investigated using the monitoring survey results. Review of any errors in data due to observer bias or conditions on site.

Revegetation and regeneration management			
		and negotiated with DAWE). No further requirements.	Review of replanting and natural regeneration area management to be undertaken. Review of weed management measures. Undertake additional active management if required to meet completion criteria Review/increase frequency of monitoring events if progress towards performance or completion criteria is not demonstrated. DAWE is to be notified accordingly.
Within 5 years, demonstrate a 20% increase in koala food trees OR Replanted areas do not require further direct maintenance (they are established/ surviving independently) AND evidence of natural recruitment of koala food trees occurring outside of replanted areas	Monitoring/compliance report to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if replanted areas do not require further maintenance and there is evidence of natural recruitment of koala food trees in designated areas, project can progress as scheduled OR if 20% increase in koala food trees demonstrated, completion criteria has been met. No further requirements.	If plantings still requiring direct maintenance (i.e. watering, tubestock replacement) or negligible native species recruitment observed in designated areas, take additional action to remove disturbing factors, alter species selection, and/or consider supplementary plantings.
Within 5 years, surveys demonstrate a 50% increase in koala density/utilisation across the koala offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if koala density/ utilisation has increased by 50%, completion criteria has been met (if demonstrated and negotiated with DAWE). No further requirements.	If 50% increase in koala density/utilisation has not been achieved, review management activities, replanted areas and movement corridors, weed and pest control programs and land use activities or additional threats. Review/increase frequency of monitoring events (koala presence surveys) if progress towards performance or completion criteria is not demonstrated. DAWE is to be notified accordingly.
Within 10 years (or earlier if demonstrated and negotiated with DAWE), habitat quality and extent has been	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if habitat quality and extent has been maintained across the koala offset	If habitat quality and extent has not increased across the koala offset areas, the program shall be extended by periods of 12 months until the criteria is met. Review methods for monitoring survey and data analysis is consistent with

Revegetation and regeneration management			
maintained across the koala offset areas		areas, completion criteria has been met. No further requirements.	previous monitoring events. Review of site conditions or other contributing factors. DAWE is to be notified accordingly.
At 10 years (or earlier if demonstrated and negotiated with DAWE), there is an increase in koala food trees by 20% (by area)	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if 20% increase in koala food tree recruitment demonstrated, completion criteria has been met. No further requirements.	If 20% increase in koala food tree recruitment has not been achieved, review disturbing factors. The management, planting or regeneration and associated control programs shall be extended by periods of 12 months until the criteria is met. DAWE is to be notified accordingly.
At 10 years(or earlier if demonstrated and negotiated with DAWE), a 50% increase of koala density/utilisation has been demonstrated across the koala offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if koala density/utilisation has increased by 50%, completion criteria has been met. No further requirements.	If 50% increase in koala density/utilisation has not been achieved, the program shall be extended by periods of 12 months until the criteria is met. DAWE is to be notified accordingly. Review management activities, weed and pest fauna control programs, and land use activities and management, and modify if required Increase plantings to improve movement corridors Consider the need for additional koala presence surveys
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, prepare planting program, identify natural regeneration areas, modify monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey
Planting program	Design and implementation schedule of planting areas within the designated planting areas. Provided with annual compliance report.		Following baseline survey
Record of site/maintenance works (Appendix E)	Record of site works and management actions, including inspections and maintenance. On-site checklist may be used for inspection events and maintenance undertaken on site.		Following site works or scheduled inspection/ monitoring event

Revegetation and regeneration management		
	Activities may be summarised in compliance report.	
Monitoring report	Reporting will summarise methods, field data, comparison against baseline and previous years and progress towards the performance or completion criteria. Report to include maps, photographs and all relevant data. Results to be summarised or included in compliance report.	Years 1, 3 and 5 Then at year 10 (unless demonstrated earlier) or until the completion criteria are met and as agreed to by DAWE

4.5.4 Weed management

Within 3 years of baseline surveys of the koala offset areas, weed infestations must be reduced by 50% compared to baseline data, and within 10 years of baseline surveys of the koala offset areas, weed infestations must be reduced by 90% compared to baseline data.

This weed control program will also assist in achieving the ecological outcome of no net loss in the quality and extent of koala habitat.

Target weed infestations include species that are known to restrict the movement or adversely impact on available habitat of the koala across the landscape. The surveys undertaken as part of the preparation of the Preliminary Documentation phase identified the following weeds on the offset sites that may restrict the movement or adversely impact on available habitat of the koala:

- Asparagus fern (*Asparagus sp*.) – one site (along watercourse)
- Camphor laurel (*Cinnamomum camphora*) – one site (along watercourse)
- Cats claw creeper (*Macfadyena unguis-cati*) – multiple sites
- Chinese celtis (*Celtis sinensis*) – one site (along watercourse)
- Lantana (*Lantana camara*) – multiple sites

Other weeds were observed (refer to Table 4-3), however may not be adversely impacting habitat or movement of the koala. Baseline surveys (undertaken by a SQP) will provide additional and more detailed information regarding the species, abundance and distribution of weed infestations, to be updated within this OMP and subsequent weed control program. Following the baseline survey, a weed control program will be developed and implemented to enhance the quality of the koala habitat.

Methods for weed control will be site-specific and appropriate to each species, with regard to best practice and relevant guidelines, such as:

- South East Queensland Ecological Restoration Framework (Chenoweth EPLA and Bushland Restoration Services, 2012)
- Local government biosecurity plans
- Biosecurity Queensland fact sheets

Methods may involve a combination of physical, chemical and/or biological methods, depending on the species and extent of infestations. Some species may require subsequent treatments due to viability of seed banks for longer periods. Appropriate minor use permits from the Commonwealth Australian Pesticides and Veterinary Medicines Authority may apply.

Weed management will also be undertaken within K-OA1, K-OA2 and K-OA3 offset areas for the black-breasted button-quail habitat, therefore weed management of koala habitat within these sites must be coordinated with weed management for these other habitats. In particular, these offset areas contain habitat for the black-breasted button-quail (refer to Section 5) to be legally secured and managed as offsets for that species, therefore a program of gradual, staged replacement of lantana thicket with native vine understorey will be implemented at these sites (rather than immediately treating all lantana infestations) in order to maintain and replace habitat for this fauna species.

Native vegetation clearing that may be required within offset areas for the purposes of undertaking weed management includes:

- Clearing that is necessary for maintaining infrastructure including fences, roads, vehicular tracks, water facilities and constructed drains
- Clearing vegetation within a watercourse
- Clearing for a necessary fence, road or vehicle track up to 10 m wide

- Clearing to reduce hazardous fuel loads and to establish fire breaks

Details of the weed management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 4-6, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 4-6 Weed management – koala offset areas

Weed management
Ecological outcomes
-Targeted weed infestations have been reduced -No net loss in the quality and extent of koala habitat
Management measures
-A weed control program will be developed and implemented by an experienced and qualified weed control specialist contractor that uses site-specific information from baseline surveys to target weed infestations, describe methods of treatment and an inspection and maintenance schedule. Control methods are to be undertaken in accordance with appropriate guidelines and standards, including the Queensland Government Biosecurity Fact Sheets for each species. TMR to be provided with weed control program prior to initial treatment. -Where weed infestations occur, treatment or removal of the disturbance will commence within one year of legally securing the offset area in order to allow for immediate replanting or natural regeneration of these areas with native species, as appropriate. -Initial treatment of infestations will target key species (i.e. lantana, cat's claw creeper, Chinese celtis), focussing on higher value areas first (e.g. areas with higher koala activity) working out towards more disturbed and cleared areas. Where possible commence control in areas of light infestations and work towards dense infestations using a mix of controls, as appropriate to the species and landscape. Additional key species to target may be identified during baseline surveys. -Staged removal of lantana infestations within the K-OA1, K-OA2 and K-OA3 offset areas (where black-breasted button-quail habitat is present) will be undertaken with staged replacement using appropriate native vine understorey species to maintain and replace habitat values for the black-breasted button-quail while still providing for movement of the koala. A method for this staged replacement will be included in the planting program (and is discussed further in Section 6.5 weed management for black-breasted button-quail offset area). Isolated individuals of lantana would not require replacement with native vine species where the surrounding vegetation structure is koala habitat (e.g. eucalypt open forest with sparse understorey and ground cover. -Control of **lantana** may include a combination of methods, such as: o Physical control by hand cutting or slashing, or selective clearing using remote control slasher/mulcher (with follow-up spot spray for regenerating stumps or seedlings as seeds can remain viable for four years and seedlings may mature after one year) o Herbicide control: ▪ Recommended herbicide agents are provided in the Queensland Government Biosecurity Fact Sheet for Lantana for chemical types, rates and application method. ▪ Basal bark spraying and cut stump methods are appropriate for single stemmed lantana ▪ Herbicide spraying of plants less than 2m high requires overall spraying of foliage to the point of run-off. Foliar spraying is not recommended within sensitive environments or adjacent to native seedlings or tubestock plantings. o Biological agents have been used to treat lantana infestations and are listed in the Queensland Government Biosecurity Fact Sheet for Lantana. -Control of **cat's claw creeper** can be undertaken in a number of different ways depending on the nature and extent of the infestation and the time of year. A combination of methods can be adopted, including:

Weed management

- Physical control methods – cut all stems/leaders
- Herbicide control – treat cut stumps/stems with spray/paint applied (cut stump method). Refer to Queensland Government Biosecurity Fact Sheet for Cats Claw Creeper for chemical types, rates and application method. Likely to require repeat follow-up herbicide application due to numerous tubers that typically regrow. Regrowth must not reach host tree canopy. Foliar spraying is not recommended within sensitive environments or adjacent to native seedlings or tubestock plantings.
- Biological control – release of tingid bug *Carvalhotingis visenda*, the moth *Hypocosmia pyrochroma* or the leaf-mining jewel beetle *Hylaeogena jureceki*

-Control of **Chinese celtis** may include a combination of physical and chemical controls, depending on individual plant size, as follows:

- Physical control – small seedlings can be hand-pulled or dug out
- Herbicide control – spot spray on plants less than 2 m tall. For larger trees, use stem injection or cut stump methods. Refer to Queensland Government Biosecurity Fact Sheet for Chinese Celtis for chemical types, rates and application method.

-Control of **asparagus fern** through:

- Digging out central stem and removing whole plant (dispose at appropriate waste facility)
- Basal bark herbicide application. Foliar spraying is only recommended where dense monocultures exist with no risk of damaging native vegetation. Refer to Queensland Government Biosecurity Fact Sheet for Asparagus Ferns.
- Ensure the plant is not the native asparagus fern (Asparagus racemosus)

-Control of **camphor laurel** through:

- Hand-pulling isolated seedlings
- Basal bark or cut-stump herbicide application of trees up to 6 m tall or stem diameter up to 30 cm
- For trees taller than 6 m, stem injection of herbicide can be undertaken, however depends on situation of target tree due to potential to cause hazard or destroy habitat/infrastructure from dead tree falling (removing the bulk of the tree before treating the stump may be preferred in certain situations). Refer to Queensland Government Biosecurity Fact Sheet for Camphor Laurel.

-Inspections and maintenance will be undertaken that includes observations on success of previous treatments in terms of extent, abundance and any regrowth of weed infestations, new weed introductions or spread, additional disturbances, follow-up treatment such as spot-spray of new shoots and removal of seedlings. Inspection and maintenance activities (or other works) shall be recorded on a checklist. The following inspection and maintenance program is to be implemented, with consideration of prevalent conditions and recent rainfall:

- Initial treatment of targeted weed infestations within six months of baseline surveys
- Inspection of targeted areas and follow-up treatment every three months in the first year after initial treatment
- Inspections and follow-up treatment every six months in years 2 and 3 after initial treatment
- Scheduled inspection and follow-up treatments once in years 4 and 5 after initial treatment
- Additional monitoring for new introductions or spread of target species during scheduled monitoring surveys, with TMR to be notified of additional treatment to occur

-Photographs and GPS data to be captured during control works

Weed management			
-Access to weed management areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the existing koala habitat on offset areas -Minor clearing or disturbance of native vegetation within or adjacent to the koala offset areas may be required to enable access to weed management areas or to maintain fences, firebreaks, access tracks or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist. -Contractor to notify TMR of any major works (e.g. clearing of a larger area of native vegetation for weed management purposes) prior to undertaking -Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the koala), or non-compliance (of management actions or conditions of approval) occurs			
Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP and weed control program with site-specific information
Inspections and maintenance of targeted weed infestations	Every three months for the first year after initial treatment Then every six months in Years 2 and 3 after initial treatment Scheduled inspection and follow-up treatments once in Years 4 and 5 after initial treatment	New weed infestations or spread of existing infestations Additional disturbance that might lead to new infestations Regrowth of treated cat's claw creeper reaching or nearly reaching host tree canopy	Update of control program methods and locations Conduct additional weed treatment, as appropriate Increase frequency of inspections and maintenance if new weed infestations require treatment Remediation of additional disturbances and prevention of further disturbance
Monitoring event (in accordance with baseline and monitoring survey program)	Years 1, 3 and 5 after baseline survey If outcomes not demonstrated at 5 years, an additional monitoring event will be scheduled at Year 10	Increased extent of weed infestation in targeted areas (species density/ cover)	Review results of weed control program, and amend OMP as required Notify TMR of additional species/areas and treatments to occur If weed infestations have not been reduced by Year 5, undertake additional treatment schedule. Extend program on a 12-monthly basis until outcome is demonstrated. Notify DAWE accordingly.

Weed management			
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations	Monitoring/compliance report to compare against baseline data and determine progress towards performance criteria	At 3 years, if a 50% reduction in targeted weed infestations has been demonstrated, project can progress as scheduled.	If 50% reduction has not been demonstrated the program shall be extended by periods of 6 months until the criteria is met. If weed treatment has not been successful, or evidence of new target species or spread to new areas through monitoring, review methods in weed control program and undertake an additional round of weed control of the same areas, potentially using different methods as appropriate. Increase inspection and treatment frequency if necessary to achieve criteria. DAWE is to be notified accordingly.
Within 5 years, demonstrate a 90% reduction in targeted weed infestations OR additional identified weed infestations have been treated	Monitoring/compliance to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if targeted weed infestations have been reduced by 90%, completion criteria has been met (if demonstrated and negotiated with DAWE). No further requirements. OR additional weed infestations identified have been treated, project can progress as scheduled.	If targeted weed infestations remain present or have spread, review methods in weed control program and undertake additional treatment. Increase inspection and follow-up treatment frequency. DAWE is to be notified accordingly.
At 10 years (or earlier if demonstrated and negotiated with DAWE),, there is a 90% reduction in targeted weed infestations	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if a 90% reduction in targeted weed infestations has been achieved, completion criteria has been met. No further requirements.	If a 90% reduction has not been achieved the program shall be extended by periods of 6 months until the criteria is met. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, prepare weed control program, modify monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey

Weed management		
Weed control program	Design and implementation schedule for control of targeted weed infestation areas. Provided to TMR prior to initial treatment.	Following baseline survey
Record of site/maintenance works (Appendix E)	Record of site works and management actions, including inspections and maintenance. On-site checklist may be used for inspection events and maintenance undertaken on site. Activities may be summarised in compliance report.	Following site works or scheduled inspection/ monitoring event
Monitoring report	Reporting will summarise methods, field data, comparison against baseline and previous years and progress towards the performance or completion criteria. Report to include maps, photographs and all relevant data. Results to be summarised or included in compliance report.	Years 1, 3 and 5 Then at year 10 (unless demonstrated earlier)

4.5.5 Pest animal management

The pest animal control program is required to demonstrate a reduction in pest abundance, maintained for 10 consecutive years from baseline surveys of the koala offset areas, compared to the baseline data. Pest abundance is defined as the number, composition and distribution of non-native vertebrate animals known to predate on the koala.

This program will also assist in achieving the ecological outcome of an increase of at least 50% of koala density achieved within 15 years.

Baseline surveys (refer to Section 4.4) will aim to identify pest animals present that are known to predate on the koala, namely wild dogs, across the offset sites. Baseline surveys will be undertaken by a SQP for koala and pest expert, and will record the following data through camera traps, indirect observation transects and passive monitoring sand plots:

- Target pest fauna species present, numbers recorded (represented by activity/detection levels) and locations recorded

Predation by wild dogs is a principal threat to koalas. Following the success of the wild dog abatement program on the Bruce Highway Cooroy to Curra Section C (Traveston to Woondum) Project, TMR have committed to fund a 10-year wild dog abatement program, carried out within a 5 km radius of the offset sites. The program will be managed by TMR using contractors with the expertise, qualifications and knowledge to best achieve the outcomes for the project. The contractors will undertake a program of target pest surveillance and control prior to undertaking any control works, and reporting documenting the outcomes of the baseline surveys, annual monitoring and pest control program.

The control program will be developed in detail following the completion of the baseline survey. The pest animal management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 4-7, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 4-7 Pest animal management – koala offset areas

Pest animal management
Ecological outcomes
-A reduction in pest abundance for 10 consecutive years -An increase of at least 50% of koala density/utilisation within 15 years
Management measures
-A pest control program will be designed, and refined using information obtained from the baseline survey (and other available data sources), and will include the identification of pest species to be targeted (namely, wild dog), likely habitat and movement corridors (including any hot-spots of activity), land parcels and stakeholders participating in control program, timelines and restrictions, the locations and types of pest surveillance sites and an indication of potential control sites, methods of control, and reporting processes. These aspects are further outlined below, but are subject to change following baseline survey and ongoing surveillance. -The pest control program is to be provided to TMR prior to commencing operations. -The pest control activities may be undertaken: o On an ongoing basis (as needed and indicated by surveillance sites to be set up) for an initial period of three years within 5 km radius of the offset areas o On a minimum six-monthly basis (or more if pest surveillance sites record increased activity levels or other opportunistic observations) for an additional seven years (total of 10 years after baseline surveys) within 5 km radius of the offset areas. o On an extended basis if the completion criteria has not been met (i.e. reduction in pest abundance over 10 years compared to baseline) -Contractor will undertake on-ground evaluation/surveillance of 'hot spots'. This may include the use of cameras, sand-plots, scat assessment, detection dog evaluation and other non-animal disturbing techniques, to establish locations for effective and efficient control activities. These may be located on non-offset land and will be in addition to annual monitoring events on offset sites. A number of surveillance sites will be established throughout the study area (5 km radius of the koala offset areas) that record species, activity and numbers of animals, which will assist data analysis and success evaluation throughout the pest control program. Individuals of target species may potentially be identified, and able to be cross-checked with animals removed. -The Contractor will undertake ongoing assessment of surveillance data, control activities and stakeholder feedback. On-ground control work may be altered based on assessment of this data, and control works may not be conducted in areas where activity is low or non-existent. -Estimates of pest species detection level or activity level and distribution over the offset sites will be provided to TMR on an annual basis. This will be analysed from annual monitoring data and supplementary data from pest surveillance sites and control activities, and compared to baseline data. -Initial control sites will be discussed with Contractor/TMR (and any other landholder) based on level of activity and viability (safety, efficacy etc). For access to land: o No monitoring or control works will be carried out on offset land or non-offset land unless Landholder Agreements have been signed by relevant landholders. Consultation and/or notification may be required with tenants on TMR-owned offset lots. o Any 'Permits to Operate' on State Land will be sought in conjunction with the Landholder Agreement Process. No work will be carried out on State Land until such time as these permits are received and forwarded to TMR for reference.

Pest animal management

- Neighbour Notifications (of upcoming control works) will be required in most rural instances. Where the area may be peri-urban, TMR/Contractor will undertake the notification process to ensure reduced risk to domestic animals.
- All participating properties with control sites will have 'Warning' signage established prior to any activities occurring within the property. These will be visible from any access points.

- On ground pest animal control may include the use of the following techniques (dependant on safety of use, stakeholder restrictions, type of animal targeted, non-target capture risks etc):
  - Soft-jaw foot-hold trapping – This will be the primary technique used for targeting wild dogs. Target specific scent lures are used, along with specialist assessment of placement for optimising capture results (and reducing off-target risks).
  - Cage Trapping – Small, medium, large and pen/yard traps, with or without real-time trail camera monitoring allowing for remote telemetry and gate activation. Pre-feeding, food and scent lures will be used to target various species.
  - Free-shooting – opportunistic free-shooting with the appropriate calibre firearm may be utilised where participating stakeholders have agreed (indicated on signed Agreement Forms).
- Abatement of other pest animals (e.g. feral pigs, foxes, feral cats) may be undertaken if these pest species are identified and little additional resourcing is needed to achieve this purpose. Any such additional control activity will be recorded and report to TMR as per the reporting schedule.
- The relevant procedures and permits for euthanasia and risk assessment for firearms will be followed at all times.
- The contractor will recover and remove all carcasses, unless an appropriate and alternative arrangement is agreed upon with the participating landholder (e.g. has equipment to dig deep burial pit) or the recovery of carcass/s is deemed too difficult (OH&S restrictions).
- All control works, including the use of a firearm, will be required to be undertaken by a suitably qualified person in accordance with a firearm safety risk assessment and all relevant procedures, permits, licences and legislative requirements.
- Photographs and GPS data to be captured during control works
- Results of the pest control program will be provided six-monthly during the first three years (half yearly interim report and yearly full report) and yearly for the remaining seven years), and will include pest surveillance site types, locations and results, on-ground control activities (species, numbers, methods of control/removal), and communications with stakeholders, as a minimum.
- Any complaints received from the public or stakeholders regarded this pest control program will be immediately reported to TMR.
- Access to pest monitoring or control sites to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the koala habitat on the offset areas.
- Minor disturbance of native vegetation within or adjacent to the koala offset areas may be required to enable access to monitoring, pest surveillance or control sites or to maintain fences, access tracks or infrastructure associated with pest surveillance or control works. Minor works are to be recorded.
- Contractor to notify TMR of any major works (e.g. clearing of a larger area of native vegetation for pest management purposes) prior to undertaking
- Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the koala), or non-compliance (of management actions or conditions of approval) occurs

Pest animal management			
Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP and pest control program with site-specific information
Pest surveillance sites – on and within 5 km radius of offset sites	Ongoing surveillance at selected locations of high activity (hot spots), with potentially changing locations. Six-monthly reporting of surveillance and pest control activities and results for the first three years (half-yearly interim report and yearly full report) Then annually for 10 years after baseline survey (combined with annual monitoring results to demonstrate reductions in pest abundance)	Limited control being undertaken due to lack of detection Significant increase in pest activity in an area	Review location and frequency of surveillance and controls and modify as required. Move monitoring sites to different potential hot spot or modify surveillance type/method. Increase frequency or modify methods of control activities (greater focus on areas close to offset sites, if necessary). Review methods of data analysis and interpretation. Determine if activities are being undertaken in neighbouring properties which may impact activity, or if there is a climatic, seasonal or other reason that may be causing increase in activity. Focus control operations on areas of increased activity as appropriate. Identify options for remedial action and consult with DAWE as required.
Annual monitoring event (in accordance with baseline and monitoring survey program) – on offset sites	Annually for 10 years after baseline survey	No demonstrated reduction in pest activity or detection	Contractor/TMR to review pest control program efficacy and modify as per above. Review methods of data analysis and interpretation. Increase frequency or modify methods of control activities (greater focus on areas close to offset sites, if necessary). Potentially increase frequency of monitoring and locations on offset areas after first year, if no reduction demonstrated.
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within 12 months of legally securing, develop and	Pest control program report to be provided to TMR prior to undertaking control works.	At 12 months, if pest control program has been developed and	Develop and implement pest control program immediately in order to commence 10 year

Pest animal management			
implement a pest control program	Details to be included in annual compliance report	commenced, project can progress as scheduled.	control and monitoring program. DAWE to be notified if commencement delayed.
Within 5 years after baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data	Annual monitoring report to compare against baseline data and determine progress towards performance and completion criteria. Details to be included in annual compliance report.	At 5 years, if a reduction in pest abundance has been demonstrated compared to baseline data, project can progress as scheduled.	If no reduction evident in first year after baseline surveys, consult with TMR and review methods of surveillance and control, as well as monitoring sites and methods within offset areas. Review data analysis and interpretation methods to determine cause of non-compliance and possible solutions. Include consideration of any external causes of non-compliance (i.e. beyond TMR's control). Determine if it can be managed through increased or modified control methods. Identify options for controls. Provide explanation if cause of non-compliance is beyond TMR's control (e.g. climatic, seasonal variation, off-site activities). Consult with DAWE as required.
At 10 years after baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data	Annual monitoring report to compare against baseline data and determine progress towards completion criteria. Completion data to be provided in compliance report.	At 10 years, if a reduction in pest abundance has been demonstrated compared to baseline data, completion criteria has been met. No further requirements.	If a 10 year reduction compared to baseline data has not been achieved, review data analysis and interpretation methods to determine cause of non-compliance and possible solutions. Include consideration of any external causes of non-compliance (i.e. beyond TMR's control). Review pest control methods, schedule, monitoring and data analysis. Modify pest control program accordingly. If no anomalies identified, the program shall be extended by periods of 12 months until the criteria is met. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, prepare pest control program, select method and placement of surveillance sites, modify annual monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey

Pest animal management		
Pest control program	Design and implementation schedule of pest control program, including target species and areas/locations, general timing of surveillance and control works, data analysis, demonstration of outcomes, remedial measures and reporting process. Provided to TMR prior to commencing control activities. Summarised in annual compliance report.	Post-baseline survey
Pest control program reports	Results of pest surveillance data and control activities to be provided to TMR. Control and surveillance activities will be altered based on ongoing assessment of this data by the pest control contractor. Shall include maps showing locations, and other relevant data.	Six-monthly for the first three years (half-yearly interim report and yearly full report) Then annually up to 10 years after baseline survey
Annual monitoring report	Report to TMR will include methods, field data, comparison against baseline data, including estimates of target pest species activity/detection levels and distribution over the offset areas. Report to include maps, photographs and all relevant data. Inclusion of relevant data from pest control program reports. Progress towards the performance and completion criteria is to be analysed and reported. Results to be summarised in annual compliance report.	Annually

4.5.6 Land use and access

For the duration of the approval, no net loss in the quality and extent of koala habitat within the koala offset areas compared to the baseline survey data will be achieved. Following baseline surveys, a program of site maintenance will be prepared to be undertaken within the following six months that limits access and land uses to those appropriate to the protection of the sites.

The offset areas will be restricted from other land uses and human activities such as stock grazing and public access for recreational or other incompatible purposes, as appropriate to the koala habitat values. Vehicles will be restricted to authorised vehicles only to prevent koala injury and/or mortality from vehicle strike and damage to regrowth or planted areas.

Internal fencing identified within the offset areas during the baseline survey that restricts koala movements within or between habitat areas or poses a risk to their safety (e.g. barbed-wire fencing) will be removed following baseline surveys. Fauna exclusion fencing will be installed where the offset area adjoins the Bruce Highway road corridor or the North Coast Rail Line, to prevent koala injury and/or mortality from vehicle or train strike.

Other evidence of land degradation, such as rubbish disposal or erosion, will be remediated or managed, as appropriate to the koala habitat values.

There are residences adjacent to the K-OA1 and the K-OA2 offset areas, which may have tenants present that will be restricted from undertaking any land use beyond their immediate cleared yard area. No dogs will be allowed on site.

Vegetation clearing activities that may be required to carry out land use and access management activities including clearing for access tracks, clearing within a watercourse, clearing to reduce hazardous fuel loads and to establish fire breaks, and maintenance of fences, roads, water facilities and constructed drains.

The land use and access management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 4-8, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 4-8 Land management – koala offset areas

Land management
Ecological outcomes
-No net loss in the quality and extent of koala habitat
Management actions
-Following baseline surveys, the OMP will be updated to include site-specific land management actions and locations of existing and proposed infrastructure, signage, and maintenance requirements. Significant land management actions will be commenced within six months of the baseline surveys. -Land use and access management activities may include: o Restriction of vehicles to established access routes or defined access points. Access tracks needed for site management activities to be restricted to site personnel with a locked gate/barrier. Un-used access tracks to be permanently closed and identified for rehabilitation, if appropriate. o Exclusion of domestic/livestock animals from the offset areas will be established through installation or repair (and maintenance) of fencing bordering residences, access points, and/or adjoining paddocks, as appropriate. o Fauna exclusion fencing will be installed where the offset areas adjoin the Bruce Highway road corridor or the North Coast Railway, to prevent koala injury and/or mortality from vehicle or train strike. This will be carried out as part of construction of the road corridor. A three-metre clear zone is required to be maintained either side of the fauna exclusion fence that will border the proposed road corridor to ensure its efficacy for koalas. o Fences that pose a risk to koalas (e.g. barbed wire fences) or restrict koala movement between habitats to be removed or replaced. Any fences erected or replaced will be koala friendly to allow for movements into and through habitat areas. Fencing will be maintained as needed, or as appropriate given site conditions or weather events. o Where fencing is deemed to not be appropriate, signs may be erected that prohibit public access into the koala offset areas and, in particular, the active weed management, pest monitoring/control, natural regeneration and planting areas. o Rubbish to be removed from the offset areas and disposed of off-site. o Existing internal/external fire breaks and access tracks to be maintained, as appropriate o Erosion control to be installed if evidence of soils loss or sedimentation of downstream waterways is identified. Any installed erosion control measures will be maintained as needed. -Inspections of land use and access management issues may be undertaken biennially with scheduled monitoring events, including observations of rubbish, public access, pest animals, damage to infrastructure, firebreak or other infrastructure maintenance requirements, or additional threats, disturbance or land degradation to be remediated. Locations to be inspected will be based on previously identified infrastructure, disturbance and maintenance areas. -Photographs and GPS data to be captured during control works -Access to land use management areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the koala habitat areas

Land management			
-Minor clearing or disturbance of native vegetation within or adjacent to the koala offsets area may be required to enable access to land management areas or to maintain fences, firebreaks, access tracks, erosion control or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist. -Contractor to notify TMR of any major works (e.g. clearing of an area of native vegetation for land use or access purposes) prior to undertaking -Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the koala), or non-compliance (of management actions or conditions of approval) occurs			
Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information for land use and access management and site maintenance	Update of OMP with site-specific information. Prepare schedule of land management and maintenance requirements. Undertake significant land management activities within six months of baseline survey event, such as removal, replacement, maintenance or additional infrastructure requirements, signage, access restriction etc.
Maintenance and any follow-up inspection of land use and access management areas	Follow-up inspection of management activities (inspection can be part of scheduled monitoring events)	Additional disturbance or threat that might lead to land degradation Maintenance requirements on existing infrastructure	Assess damage or maintenance requirements. Additional inspections and maintenance may be required if new threats identified requiring additional management. Remediation of additional disturbances and prevention of further disturbance.
Scheduled monitoring event (in accordance with baseline and monitoring survey program)	Years 1, 3 and 5 for up to 5 years after baseline survey If specific outcomes not demonstrated at 5 years, an additional monitoring event will be scheduled at 10 years	Additional disturbance or threat that might lead to land degradation Maintenance requirements on existing infrastructure	Additional inspections and maintenance may be required if new threats identified requiring additional management. Undertake additional or ongoing maintenance or repair to infrastructure.
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within 5 years of baseline surveys, habitat quality and	Monitoring/compliance report to compare against baseline data and	At 5 years, if habitat quality and extent is the same or better than baseline across	If habitat quality or extent has reduced, site-specific details should be investigated using the annual monitoring survey results. Review of

Land management			
extent has been maintained across the koala offset areas	determine progress towards performance and completion criteria	the offset areas, completion criteria has been met (if demonstrated and negotiated with DAWE). No further requirements.	management of land access and use. Modify management of any areas with increased degradation or new disturbances. DAWE is to be notified accordingly.
Within 10 years (or earlier if demonstrated and negotiated with DAWE), habitat quality and extent has been maintained across the koala offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if habitat quality and extent has been maintained across the koala offset areas, completion criteria has been met. No further requirements.	If habitat quality and extent has reduced across the koala offset areas, the program shall be extended by periods of 12 months until the criteria is met. Ensure methods for monitoring survey and data analysis are consistent with previous monitoring events. Review of site conditions or other contributing factors. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP and summarised in annual compliance report.		Post-baseline survey
Record of site/maintenance works (Appendix E)	Record of site works and management actions, including inspections and maintenance. On-site checklist may be used for inspection events and maintenance undertaken on site. Activities may be summarised in compliance report.		Following site works or scheduled inspection/ monitoring event
Monitoring report	Reporting will summarise methods, field data, comparison against baseline and previous years and progress towards the performance or completion criteria. Report to include maps, photographs and all relevant data. Results to be summarised or included in compliance report.		Years 1, 3 and 5 Then at year 10 (unless demonstrated earlier)

4.5.7 Other management actions

Bushfire management

Bushfires can impact koalas in a number of ways including depletion of food sources and habitat, fragmentation of habitat, and koala mortality as a direct result of hot crown fires.

Some of the offset areas border the Curra State Forest in Curra and the Woondum State Forest in Woondum, which are actively managed for forestry purposes by DES. Liaison and planning with DES on an annual basis is advised to achieve effective fire management outcomes for the offset areas, particularly adjacent these heavily wooded areas.

Any controlled burns or management activities will be undertaken as required in consultation with local council, the rural fire brigade and/or Queensland Fire and Emergency Services. It is not recommended to undertake controlled burns within existing koala habitat.

Vegetation clearing activities that may be required to reduce the risk of bushfires within and adjacent to the offset areas include:

- Clearing for a firebreak or necessary fire management line up to 10 m wide in areas adjoining the koala habitat and/or during an imminent bushfire emergency to preserve remainder of the habitat areas
- Clearing to remove risk of personal injury or damage to infrastructure
- Reducing hazardous fuel loads under the *Fire and Emergency Service Act 1990*
- Clearing that is necessary for maintaining infrastructure including fences, roads, vehicular tracks, water facilities and constructed drains

A three-metre clear zone is required to be maintained either side of the fauna exclusion fence that will border the proposed road corridor to ensure its efficacy. This clearing also operates as a fire break.

The koala offset areas will be managed to reduce the risk of impacts from bushfire, through a targeted weed control program (refer to Section 4.5.4) and land use management and maintenance of existing internal and external fire breaks (refer to Section 4.5.6).

Flood management

There may be areas of localised flooding or ponding in some parts of the offset areas. Baseline surveys will seek to identify areas showing evidence of inundation along or adjacent waterways, through debris, damage, or changes in community/species or structure present.

Revegetation, regeneration, weed management and land use and access management actions will consider the impact of periodic inundation on the activities to be undertaken in such areas, and their likely effectiveness, as well as the timing of such activities.

Should management actions be impacted by inundation, the OMP will be reviewed and modifications to management activities and locations will be undertaken accordingly.

4.6 Auditing and review

Following baseline surveys, management measures in the OMP may be updated to include site-specific requirements, if relevant and appropriate (such as locations of weed infestations to be targeted for weed control, locations of existing infrastructure and proposed maintenance or removal, locations of areas to target for planting and natural regeneration, locations of relevant disturbances and threats to be managed/removed, any updates to timing).

The OMP for the koala will be reviewed as part of the compliance reporting process following baseline surveys and at Years 1, 3 and 5 after scheduled monitoring events.

Any relevant changes to the timeframes to achieve the performance criteria will be formally submitted to DAWE for approval.

Independent audits will be undertaken upon request by DAWE in accordance with Conditions 23, 24 and 25 of the EPBC approval.

4.7 Compliance reporting

4.7.1 Annual compliance report

An Annual Compliance Report will be prepared that includes the koala offset areas, as relevant to that year, in accordance with Condition 20 of the EPBC approval and the DAWE's *Annual Compliance Report Guidelines* (2014). The compliance report will include:

- Details of compliance, incidents and non-compliance
- Management actions undertaken within the offset areas and as part of control programs (with associated documentation attached)
- Remediation measures to be implemented where monitoring of the performance criteria indicates failure to achieve required outcomes
- Progress towards and achievement of the ecological outcomes and completion criteria outlined in Section 4.5.2

The results of baseline and monitoring surveys will be included in the annual compliance reports, as relevant to that year. Baseline data will be compared with monitoring data to demonstrate changes in offset area habitat quality scores and for identifying progress of management actions against the performance indicators and completion criteria. Remedial action or adaptive management will be provided based on monitoring results.

Results of the weed control program and planting/regeneration program will be included in the annual compliance report, as relevant, including inspections, control and maintenance activities undertaken on-site and follow-up treatments/monitoring conducted.

4.7.2 Reporting non-compliance

Notification in writing to DAWE must be made for any incident, non-compliance with the conditions, or non-compliance with the management action commitments made in this OMP, in accordance with Conditions 21 and 22 of the EPBC approval.

Notification must be made as soon as possible and no later than 5 business days after becoming aware of the incident or non-compliance.

5. Black-breasted button-quail

5.1 Term of offset management plan

The commencement of the Project action is scheduled to occur in June 2020.

The offset areas will be legally secured prior to commencement, as outlined in Section 1.5 and described in Section 3.

The management actions and criteria outlined in this OMP shall be delivered and achieved by TMR, or on behalf of TMR, by the 10th anniversary of legally securing the offset areas, anticipated as June 2030, unless demonstrated earlier and negotiated with DAWE. Reporting of completion of ecological outcomes will be provided in annual compliance reporting at the end of the relevant year following legally securing.

This section of the OMP has been prepared to satisfy the approval conditions as set out in Table 5-1.

Table 5-1 Approval conditions applicable to black-breasted button-quail

Condition	Timing	Evidence of compliance	Section of OMP
9 Legally secure black-breasted button-quail offset areas	Prior to commencement	Within 20 bd of legally securing (prior to commencement), provide to DAWE the date of legally securing and electronic spatial data and offset attributes	Section 1.5 Approval conditions timeline Section 3 Legal Security
10 Complete baseline surveys	Within six months of legally securing	Within one year of legally securing, publish on website and provide to DAWE results of baseline surveys	Section 6.4 Baseline and monitoring surveys
11 Provide results of baseline surveys and management measures	Within one year of legally securing	Within one year of legally securing, publish on website and provide to DAWE results of baseline surveys AND details of management measures and risk assessment to deliver outcomes	Section 6.4.5 Baseline survey - Reporting Section 6.5 Offset delivery
12a Ensure no net loss in quality and extent of black-breasted button-quail habitat	Within one year of baseline survey	Compliance reporting	Section 6.4 Baseline and monitoring surveys Section 6.5 Offset delivery
12d i. Demonstrate 50% reduction^ in weed infestations for black-breasted	Within three years of baseline survey	Compliance reporting	Section 6.4 Baseline and monitoring surveys Section 6.5.4 Weed management

Condition	Timing	Evidence of compliance	Section of OMP
button-quail offset areas			
12d ii. Demonstrate 90% reduction^ in weed infestations for black-breasted button-quail offset areas	Within 10 years of baseline survey	Compliance reporting, completion data	Section 6.4 Baseline and monitoring surveys Section 6.5.4 Weed management
12f Demonstrate a reduction^ in pest abundance	Within 10 years of baseline survey	Compliance reporting, completion data	Section 6.4 Baseline and monitoring surveys Section 6.5.5 Pest animal management
12g and 20 Annual compliance reporting	Annually	Compliance report provided each 12 month period following date of commencement and published on website within 60 bd	Section 6.7 Compliance reporting

^ compared to the baseline survey results

5.2 Offset management responsibility

For the life of the OMP, information regarding the proposed works and maintenance of the three TMR-owned black-breasted button-quail offset areas can be obtained from TMR.

Any existing residences within the cleared portions of the subject lots will potentially be tenanted for the duration of the management period.

5.3 Offset area locations and descriptions

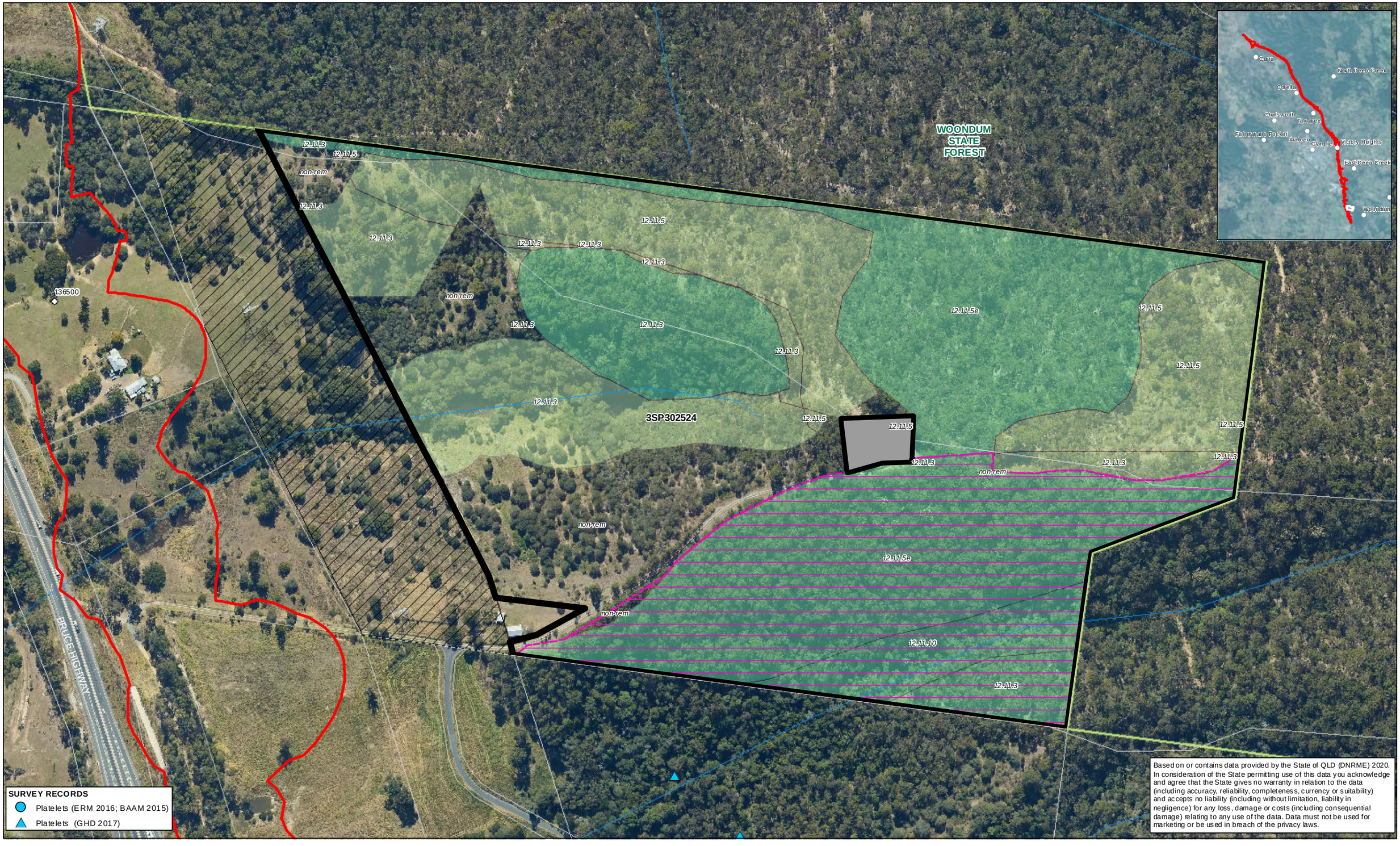
5.3.1 Location of offset sites

The offset areas for the black-breasted button-quail are outlined in Table 5-2. Each area is further described in Section 5.3.2. The total lot area to be legally secured includes offset areas for other MNES, such as existing koala habitat and koala habitat to be revegetated or regenerated.

A plan showing the offset areas for the black-breasted button-quail is provided in Figure 3.

Table 5-2 Black-breasted button-quail offset sites

Offset area name	Lot on plan	Ownership	Tenure	Offset area (ha)	Total area to be secured (ha)
BBBQ-OA1	Lot 2 SP302526	TMR	Freehold	13.63	15.20
BBBQ-OA2	Lot 3 SP302524	TMR	Freehold	7.83	28.25
BBBQ-OA3	Lot 102 SP297908	TMR	Freehold	11.22	12.65



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Excluded
- Project Footprint
- Property Boundary
- Easement
- BBBQ-OA2

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Area BBBQ-OA2

3SP302524

Job Number	41-29914
Revision	C
Date	21 Feb 2020

Figure 3
Sheet 1 of 3

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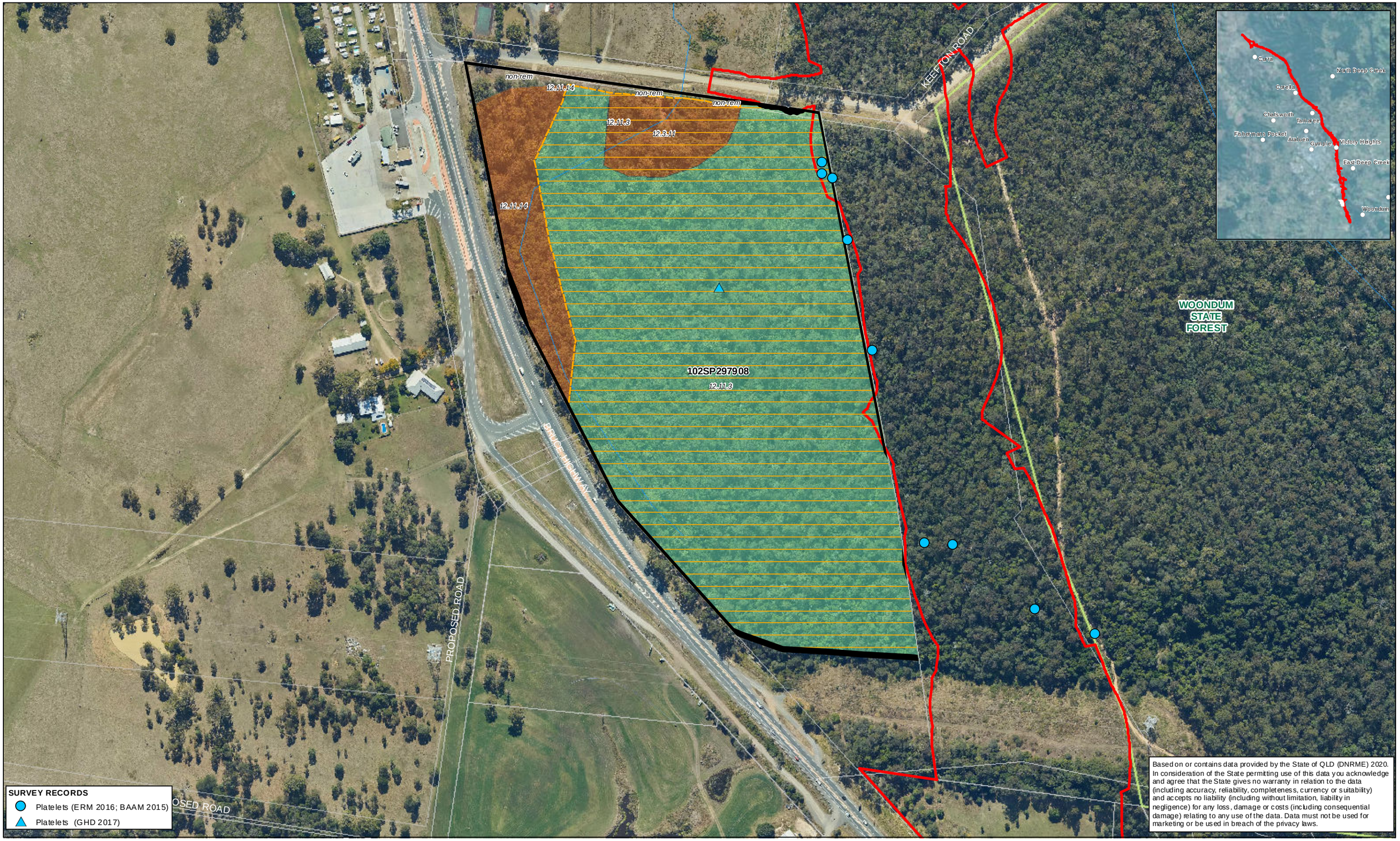
6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

Data source: DNRME: Watercourse (2010), Cadastre (2019), Rail (2014), Roads (2016), Towns (2015), Protected Areas (2014), Imagery (2018/2019); TMR: Imagery, Survey Area, Chainage, Areas Assessed (2016/2018). GHD: Project Area (December 2016), BBBQ Platelets (2017), Ground truthed Regional Ecosystem, Offset Sites (2019); ERM/BAMM: BBBQ Platelets (2015/2016). Created by:xlee



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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- BBBQ-OA3

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Area BBBQ-OA3

102SP297908

Job Number	41-29914
Revision	C
Date	21 Feb 2020

Figure 3
Sheet 2 of 3

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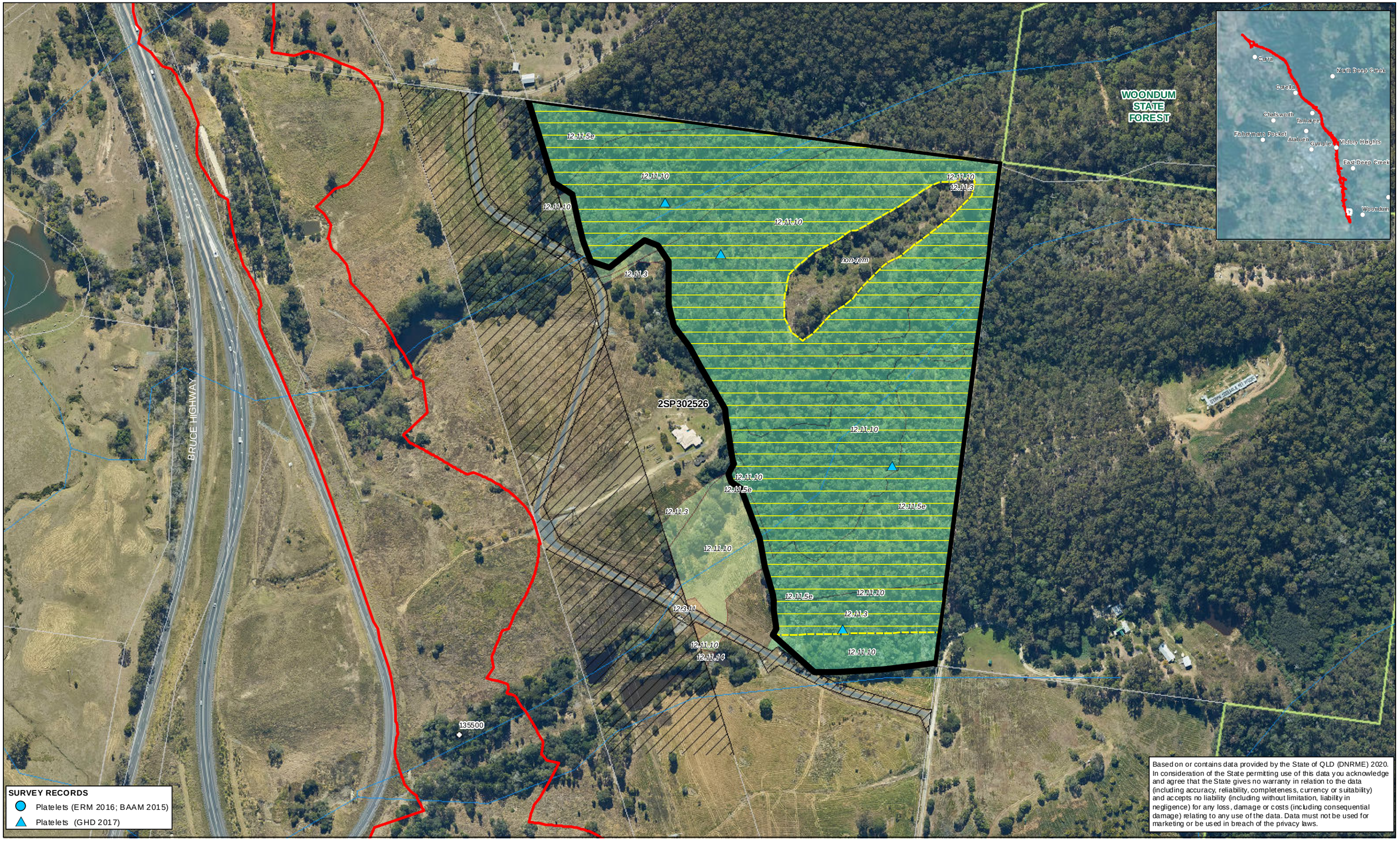
6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

Data source: DNRME: Watercourse (2010), Cadastre (2019), Rail (2014), Roads (2016), Towns (2015), Protected Areas (2014), Imagery (2018/2019); TMR: Imagery, Survey Area, Chainage, Areas Assessed (2016/2018). GHD: Project Area (December 2016), BBBQ Platelets (2017), Ground truthed Regional Ecosystem, Offset Sites (2019); ERM/BAMM: BBBQ Platelets (2015/2016). Created by:xlee



Paper Size A3

0 25 50 100

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Watercourses
- Road/Track
- Offset Areas
- Project Footprint
- Property Boundary
- Easement
- BBBQ-OA1

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Offset Area BBBQ-OA1

2SP302526

Job Number	41-29914
Revision	C
Date	21 Feb 2020

Figure 3
Sheet 3 of 3

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6 Innovation Parkway Birtinya QLD 4575 Australia **T** 61 7 5413 8100 **F** 61 7 5413 8199 **E** bta01mail@ghd.com **W** www.ghd.com

Data source: DNRME: Watercourse (2010), Cadastre (2019), Rail (2014), Roads (2016), Towns (2015), Protected Areas (2014), Imagery (2018/2019); TMR: Imagery, Survey Area, Chainage, Areas Assessed (2016/2018). GHD: Project Area (December 2016), BBBQ Platelets (2017), Ground truthed Regional Ecosystem, Offset Sites (2019); ERM/BAMM: BBBQ Platelets (2015/2016). Created by:xlee

5.3.2 Description of offset sites

BBBQ-OA1 (Lot 2 on SP302526)

This lot was previously formally described as Lot 1 on RP35055.

The lot comprises the following mapped remnant and field-verified potential habitats for the black-breasted button-quail:

- RE 12.11.3 – Eucalypt open forest with vine forest and lantana understorey (platelets recorded)
- RE 12.11.5e – Eucalypt open forest with dense lantana understorey (suitable or potential habitat connected to platelets record)
- RE 12.11.10 – Araucarian vine forest, and eucalypt open forest with some vine forest present (platelets recorded)

Three ephemeral waterways flow through the site, some stable or low erosion risk and some with evidence of channel erosion.

There are weed species present on the site, primarily lantana with some cat's claw creeper and passionflower vine.

There is a residence located in the cleared area of the lot, with associated land use, infrastructure and access. There are some access tracks through vegetated areas. The site is subject to edge effects from adjoining cleared areas and infrastructure. There is evidence of logging activities that have previously occurred in some areas on the site.

Access to this site is via an access easement north from Woondum Road. There is also an access track to the north-east corner of this lot from Woondum State Forest.

Plate 5-1 shows representative habitat on this site.

Plate 5-1 Representative habitat on BBBQ-OA1

BBBQ-OA2 (Lot 3 on SP302524)

This lot was previously formally described as Lot 2 on RP891751.

The lot comprises mapped and field-verified areas of eucalypt open forest containing REs 12.11.3, 12.11.5e and 12.11.10, which are connected to platelet records and considered to be potential habitat for the black-breasted button-quail. These vegetated areas are directly connected to the BBBQ-OA1 Lot 2 on SP302526.

The site has similar characteristics to BBBQ-OA1, with evidence of previous logging activities and weed cover identified (lantana, cat's claw creeper, passionflower vine). There is also a residence to the north of the offset areas. The site is subject to edge effects from adjoining cleared areas and infrastructure. The site is directly connected to Woondum State Forest.

Access to this site is via an access easement north from Woondum Road, which traverses Lot 2 on SP302524 to the south. There are also access tracks to this lot from Woondum State Forest.

Plate 5-2 shows representative habitat on this site.

Plate 5-2 Representative habitat on BBBQ-OA2

BBBQ-OA3 (Lot 102 on SP297908)

This site was previously part of Woondum State Forest within Lot 983 on FTY1488 but has since been revoked as part of the Project as it will be separated from the State Forest by the future State-controlled road corridor.

The lot includes the following mapped remnant and field-verified potential habitat for the black-breasted button-quail:

- RE 12.11.3 – Eucalypt open forest with rainforest understorey elements (multiple platelets recorded across multiple survey events 2015-2017)
- RE 12.3.11 – Eucalypt open forest (potential habitat connected to platelets records)

The site has previously been subject to logging but has low weed cover (lantana, Brazilian nightshade, cadaghi). The site is subject to edge effects from adjoining cleared areas and infrastructure. Connectivity to the State Forest will be provided by the construction of a fauna underpass.

Access to this site is via Keefton Road and the existing Bruce Highway.

Plate 5-3 shows representative habitat on this site.

Plate 5-3 Representative habitat on BBBQ-OA3

5.4 Baseline and monitoring surveys

5.4.1 Purpose of surveys

Condition 10 of the EPBC Act approval states that baseline surveys of the black-breasted button-quail offset areas must be undertaken by a SQP within six months of legally securing the offset areas. The baseline surveys must include details of:

- The quality of black-breasted button-quail habitat, where:
  - Quality is defined in the approval document as a measure, as determined by a suitably qualified person, of site condition, site context and species individual or population persistence or species stocking rate calculated in accordance with the requirements of the EPBC Act offsets assessment guide or other biocondition assessment process agreed by the Department. The assessment process must use a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to baseline data acquired to demonstrate achievement of relevant milestones required in Condition 12.
  - Black-breasted button-quail habitat is defined as any areas of vegetation that provides habitat suitable for the Black-breasted button-quail as described in the current conservation and/or recovery plan for the species approved by the Minister.
- Weed infestation:
  - Defined in the approval document as the abundance, composition and distribution of non-native flora species known to restrict the movement or adversely impact on available habitat of the black-breasted button-quail across the landscape, as determined by a field survey over the entire black-breasted button-quail offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to data acquired to demonstrate achievement of the milestones required under Condition 12.c.
- Black-breasted button-quail presence
  - Defined in the approval document as the number of black-breasted button-quail identified on the black-breasted button-quail offset area, including evidence of black-breasted button-quail foraging, sheltering or otherwise using available habitat within the black-breasted button-quail offset area.
- Pest abundance:
  - Defined in the approval document as the number, composition and distribution of non-native vertebrate animals known to predate on the Black-breasted button-quail, as determined in a field survey over the entire Black-breasted button-quail offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to data acquired to demonstrate achievement of the milestone required under Condition 12.f.

The maintenance and improvement of the black-breasted button-quail habitat in the offset areas can then be measured against the baseline data to determine the success of the offset.

The baseline survey will be replicated for scheduled monitoring events.

5.4.2 Survey timing and general limitations

The baseline surveys of all black-breasted button-quail offset areas are to be completed within six months of legally securing the offset areas (or as appropriate to peak activity season for target pest fauna species, if advised prior to DAWE).

There is no evidence of the black-breasted button-quail undertaking seasonal or long-distance movements (Marchant & Higgins 1993, cited in Commonwealth of Australia 2010). The breeding season generally occurs from September to April however breeding can occur throughout the year at certain localities (Hughes & Hughes 1991; Smyth & Young 1996, cited in Commonwealth of Australia 2010). The species is likely to be detected year-round, although detectability may be impacted by factors such as heavy rainfall and flooding, or dense understorey limiting visibility.

Patterns of fauna activity and presence-absence data can be affected temporally by time of day/night, seasonal changes, and yearly changes (as well as those brought about by the impacts of climate change).

There are also detectability errors that arise for certain methods and habitat types. Scat and other indirect signs of fauna, such as foraging platelets and pest fauna scat, decay over time at a rate depending on the conditions at the site.

Wide-ranging fauna (such as pest species) and highly active/moving fauna may vary results by being absent during the particular survey sampling effort or indicating a higher level of utilisation through their spatial extent of scat and other indirect evidence. Some target pest fauna have peak activity seasons, such as end of winter through to late spring for wild dogs (after pups have whelped) up to late summer for foxes (after cubs have left the den sites), while others are variable throughout the year (such as feral cats and pigs). Some monitoring techniques for pest species may include non-passive measures such as camera traps with lures, which may change the behaviour of individuals of pest species. Additionally for pest species, where active control is being undertaken, behaviour or movement pathways of target species or individuals may alter, thereby potentially altering the results captured at monitoring sites.

Baseline survey and monitoring of pest fauna will be based on best practice techniques and principles in relevant scientific literature. Pest abundance data that relates to numbers of a species relative to the whole species populations will not be captured as part of the proposed methods, however an indicator of estimated numbers (such as an index of activity or detection level) may be used as appropriate to the monitoring methods, due to the size and positioning of the areas to be monitored and target species to be controlled.

To avoid increased limitations to the surveys:

- All field staff/observers should be trained in the survey method and standards prior to commencing surveys
- Surveys not to be undertaken during inclement weather
- Conditions should be recorded at the time of each survey in a systematic and standardised manner
- Repeat surveys at the same locations wherever possible
- Monitoring locations for pest abundance may be both on and off the offset properties (where possible and suitable) to collect data of long-ranging species activities

5.4.3 Personnel

The baseline surveys will be conducted by one or more SQPs.

A SQP, as defined in the EPBC Act approval, is a person who has professional qualifications, training, skills and at least three years of relevant experience specific to locating, identifying and conserving the black-breasted button-quail. The SQP must be able to give authoritative independent assessment, advice and analysis specific to the black-breasted button-quail using the relevant protocols, standards, methods and/or literature. Where the person does not have the appropriate professional qualifications, they must have at least five years of relevant experience specific to the black-breasted button-quail.

The 2017 EPBC Act Survey Guidelines for Australia's Threatened Birds (Commonwealth of Australia, 2010) states: "surveys should be conducted by appropriately experienced observers who have excellent identification skills, including familiarity with species' calls and a good knowledge of bird behaviour, at least in relation to the taxa/taxon being targeted".

Detailed survey programs will be designed with input from the SQP and specialist contractors (e.g. pest expert, botanist, revegetation or weed control contractors) in order to capture adequate data and develop effective programs for pest control, revegetation, and weed control. The SQP will be accompanied by specialist contractors during baseline surveys, as appropriate.

5.4.4 Survey methods

The baseline surveys must be undertaken with regard to the best practice guidelines in effect at the time of the surveys:

- 2017 EPBC Act Survey Guidelines for Australia's Threatened Birds (Commonwealth of Australia, 2010)
- In Queensland, the Department of Environment and Heritage Protection's Guide to determining terrestrial habitat quality ('the Guide') (EHP, 2017) is a best practice guideline appropriate for determining habitat quality for offset sites.
- The Queensland Herbarium's (Department of Environment and Science) Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (current version 3.0, June 2018) provides standards for preparing and conducting fauna surveys.

The baseline surveys will include a combination of direct and indirect survey methods, as described below to satisfy the requirements of Condition 10.

Survey design

The survey team (SQP and any specialist contractors required) shall prepare a detailed survey program that outlines the following:

- Survey effort - number of surveys for each aspect including locations and number of days
- Survey methods, including guidelines and procedures adopted, timing, sample design, details of targeted searches, criteria to be used.
- Details of SQP and specialist contractors
- Map of survey sites
- Any relevant proformas and checklists for repeat surveys

The survey program shall be approved by TMR prior to implementation. The survey program should include the below methods and reporting for both baseline and monitoring events.

Habitat quality

Assessments of black-breasted button-quail habitat quality will be undertaken in accordance with the Guide as well as the template provided by the DAWE titled 'Modified QLD Habitat Quality spreadsheet – template' (shown in Appendix D), as relevant, which will include desktop and field assessments as follows:

- Site condition:
  - Condition assessment plots will be permanently established during baseline surveys and used for scheduled biennial monitoring survey events. These will follow the desktop and field assessment requirements and selecting sites/assessment units of the Guide. This condition plot method is further described in Section 4.4.4.

- Site context:
  - Desktop assessment including the GIS attributes of size of patch, connectedness, contract and ecological corridors from the Guide. These assessments have been undertaken for the offset sites as part of the approval documentation, and are provided for reference in the table in Appendix C.
  - Species habitat index assessment will be undertaken on-site for the attributes of threats to species, species mobility capacity, and role of site location to species overall population in the state in accordance with the Guide.
- Species stocking rate (not assessed using the Guide):
  - Assessment of presence on or adjacent to site, species usage of the site (e.g. dispersal, foraging, breeding), approximate density (per hectare), and role/importance of species population onsite (i.e. key source population for breeding/dispersal, necessary for maintaining genetic diversity, and near the limit of the species range). Note, these parameters will be adapted as relevant to the species, survey methods and the site.

The template to be used for deriving and inputting the desktop and field attributes is shown in Appendix D. The 'Modified QLD Habitat Quality spreadsheet – template' refers to the Guide to determining terrestrial habitat quality version 1.2 (dated April 2017), which should be referred to for guidance.

Weed infestation

Baseline surveys will identify weed infestations to be targeted during the weed control program, incorporating the abundance, composition and distribution of non-native flora species known to restrict the movement or adversely impact on available habitat of the black-breasted button-quail across the landscape. Surveys will describe (as a minimum):

- Target species present
- GPS locations of individuals or patches, as appropriate
- General rating of abundance (e.g. classes from Queensland Annual Pest Distribution Survey of: occasional and localised, occasional and widespread, common and localised, common and widespread, abundant and localised, abundant and widespread)
- Extent of infestation represented by an estimate of cover in sample quadrats (e.g. 10 permanent quadrats per offset site of 10x10m with visual assessment of percentage density/cover or number of stems/area, as appropriate to the growth form)

Weed species that should be considered for targeting within the black-breasted button-quail offset areas, if present and dependent on the extent and positioning of the infestation (based on potential weed threats described in the National recovery plan for the black-breasted button-quail *Turnix melanogaster* (Mathieson and Smith, 2009)), include:

- Cat's claw creeper (*Dolichandra unguis-cati*)
- Lantana (*Lantana camara*)
- Madeira vine (*Anredera cordifolia*)

Black-breasted button-quail presence

The survey for species presence shall be undertaken in accordance with all relevant guidelines including the 2017 EPBC Act Survey Guidelines for Australia's Threatened Birds and the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland. Additional specialist advice has also been provided by Patrick Webster, PhD Candidate from the University of Queensland, School of Earth and Environmental Sciences, who has undertaken a number of studies on button-quails, including the black-breasted button-quail.

The surveys shall be designed and undertaken by a SQP and include the following:

- Active diurnal searches for birds present (may be flushed out during walk through of an area) and signs of foraging (feeding platelets and faeces). Record number of birds detected and/or location and size of platelets and faeces with GPS locations and photographs captured. The Survey Guidelines for Australia's Threatened Birds recommends a survey effort of 15 person hours for active searches, undertaken over three days (for areas less than 50 ha).
- Factors that can be used to distinguish the target species from the commonly occurring painted button-quail include:
  - Black-breasted button-quail platelets are typically larger than painted button-quail platelets (though not always) (pers comm Patrick Webster, UQ)
  - Black-breasted button-quail are almost entirely insectivores and their faeces contain shiny pieces of exoskeleton in a globular shape (or globular with tube), while painted button-quail faeces are typically long, thin and banana/sausage shapes with a large proportion of seed content (pers comm Patrick Webster, UQ).
- Where platelets are found, camera traps will be set up to verify the species presence and provide an indication of numbers of birds in that location. The recommended set up is a horizontally mounted camera that sites 20 cm above the ground facing a foraging area. A monitoring period of two weeks is considered sufficient to detect the bird (pers comm Patrick Webster, UQ). Between 5 and 10 cameras are likely to be required, as a minimum. The number of cameras and the specific locations will be determined by the SQP as part of the design of the survey and implemented during the baseline survey when foraging areas are located.
- Record the location and sound of any black-breasted button-quail calls heard
- Habitat assessments will also be undertaken at locations where birds (or indirect evidence of birds) are observed and at camera trap sites to record a general description of habitat type and vegetation structure, landscape context, and any other habitat features present.
- Provide data and maps showing the results of the field assessments for each offset site

Pest abundance

Baseline surveys will be undertaken to determine levels of pest abundance (defined for the purpose of this OMP as the number, composition and distribution of non-native vertebrate animals known to predate on the black-breasted button-quail). Data will be gathered on the pest species present, detection/activity levels, and distribution relative to the offset areas only. Pest control will target wild dogs, feral cats, pigs and foxes.

The baseline surveys will systematically collect data in a scientific and repeatable manner by a team consisting of an SQP for black-breasted button-quail and pest fauna specialists. The baseline surveys will include the following:

- A desktop assessment to determine appropriate/likely habitat areas and movement corridors (using aerial imagery overlays and available data), such as along roads, tracks, creeks, cleared easements or firebreaks, and fence lines. The overall assessment area will encompass a 5 km radius of the black-breasted button-quail offset sites, to cover realistic pest fauna ranges. An initial site reconnaissance may also be undertaken to identify landscape features and suitable locations for monitoring equipment.
- Transects (locations based on the desktop assessments) will be established and undertaken for collection of indirect observation data, providing evidence of the presence of pest species. Indirect evidence would be obtained from predator scats, diggings, den sites, and tracks. Sand plots may be established to assist with collection of track/movement data in suitable locations. Detection dog searches may be utilised to identify dens and regular predator use pathways.

- Infra-red motion-sensor cameras will be positioned in suitable locations within the offset sites and used to passively (no lure) or actively (with lure) monitor quantitative pest abundance (verified species and numbers). Camera trap survey design (placement, spacing and duration) will follow guidelines set out in the NSW Department of Primary Industries' An introduction to camera trapping for wildlife surveys in Australia (2012), including:
  - Camera traps will be in place for minimum of 14 nights and, ideally, up to four weeks. Due to known long-ranging rotational movements of wild dogs, in particular, in the area, the longer the monitoring period the better.
  - Camera monitoring locations will be a minimum of 1 km apart (if on a lineal pathway) and placed in the most suitable locations for detecting pest presence/movements. These sites are likely to overlap with the indirect evidence observation monitoring locations.
  - All camera trap locations will be marked with GPS and images collected will be date/time stamped. A suitable coding, storing, and sorting program will be used to ensure image data can be collated and compared in a manner to produce scientifically meaningful data.

Baseline surveys for target pest fauna may need to be undertaken during the peak activity season for that species (e.g. after winter for wild dogs).

The data collected during the baseline surveys will be used to provide information on pest fauna species present, predator activity/detection levels (as an estimate of numbers present), and estimates of distribution across the offset sites, which can then be compared over time.

Baseline surveys of the offset sites will also assist in identifying any regular movement corridors and 'hot spots' that may be able to be targeted during pest control surveillance and actions. This information will be used to assist in the design of the pest control program on and surrounding the offset sites.

Where possible, monitoring locations on the offset sites will remain consistent for the duration of the required monitoring and control programs. Where 'hot spots' of pest activity are identified elsewhere through opportunistic observations or control work, changes to monitoring locations may be required, provided that the scientific rigor of the data is not impacted. Monitoring will be undertaken annually for a minimum of 10 years (in addition to pest control surveillance locations to be set up as part of the pest control program).

General site features

Additional site features to be located and recorded during baseline surveys include:

- Location of fences or other infrastructure to be removed, replaced or repaired
- Locations of access tracks
- Areas of lantana thicket to be targeted for stage replacement with native vine understorey species, including vegetation community and structure, locations and photographs
- Locations of fire breaks and evidence of past fires
- Presence of waste to be removed
- Evidence of erosion that requires remediation
- Evidence of past and current land use, access and other human activities (e.g. logging, recreational vehicle access, stock grazing)
- Natural disturbances such as tree falls, dieback due to drought, flood or other natural disaster
- Any other threats or degradation of the land and habitat
- Photos of recorded features and at permanent photo monitoring points

- Locations of permanent photo monitoring points

Features recorded are to be shown on maps, if relevant to management or maintenance.

Scheduled monitoring survey

The above baseline elements will be monitored biennially (Years 1, 3 and 5) after the baseline survey event for the first five years after legally securing (except for the pest abundance survey, which is further described below).

The following aspects of active management areas will also be monitored biennially to assess the offset areas progress towards the ecological outcomes (as set out in Section 5.5.1):

- Weed management areas: Representative sample sites will be assessed across the offset areas to estimate cover and extent for targeted weed infestations, and capture general observations for example - new weed infestations of target species, additional disturbances or land degradation, evidence of native or non-native recruitment where weeds have been removed, evidence of maintained vine understorey in areas subject to staged replacement of lantana with native understorey species within black-breasted button-quail habitat, evidence of successful treatment methods, additional required maintenance of weed infestations or supplementary plantings.
- Land use and access management areas: General observations, for example - evidence of increased disturbance or recovery where natural or non-natural disturbances have been previously identified; effectiveness of remediation measures (e.g. erosion control); maintenance requirements for fences or access tracks
- Capture of photographs at permanent monitoring points and to demonstrate changes to any of the above features or active management areas

The above elements can be captured in the form of a checklist/table proforma for ease of use and repeatability.

The scheduled monitoring event is additional to prescribed inspection and maintenance schedules for the supplementary planting areas, weed control or pest control programs (to be developed, as outlined in Section 6.5).

The monitoring data (including baseline elements) will be collected biennially (Years 1, 3 and 5) from the time of the baseline surveys until approximately 5 years after the baseline survey. If ecological outcomes are demonstrated to be achieved at the 5 year monitoring event, completion data will be provided to demonstrate compliance with completion criteria, and will be negotiated as completed with DAWE.

If further monitoring is required to demonstrate completion of ecological outcomes:

- Targeted and representative weed infestations will be monitored at 10 years to demonstrate a 90% reduction

Pest abundance

Pest fauna species, detection/activity levels and locations recorded across the offset areas will be monitored annually as part of the pest control program to demonstrate a reduction over 10 years when compared to baseline data. The baseline surveys will be replicated at offset sites using camera traps, indirect evidence transects, sand plot locations and/or dog detection for den sites. Where possible, monitoring locations will be the same as for baseline, however where ‘hot spots’ of pest activity are identified elsewhere through opportunistic observations or control work, changes to monitoring locations may be required, provided that the scientific rigor of the data is not impacted. Monitoring locations both on and off the offset properties may be utilised where possible and suitable.

5.4.5 Reporting

Update of OMP

Following baseline surveys, the following sections of this OMP may be updated:

- Figures showing types and locations of features to be targeted for management, as advised by the SQP with the aim of achieving the ecological outcomes (including weed infestations to be targeted, areas to be revegetated, access restrictions, infrastructure such as fences and tracks to be maintained or removed, disturbances/threats to be managed, additional records or sightings)
- Update of management measures as appropriate and for site-specific requirements
- Review register (as relevant to the updated sections)

Baseline and monitoring survey report

A baseline survey report will be provided/published within one year of legally securing the offset areas. Monitoring reports will be prepared following scheduled monitoring events.

The report shall include:

- Results of site condition plots, site context analysis, fauna species index assessments and species stocking rate elements
  - The site condition, site context and species stocking rate inputs will be added to the template (shown in Appendix D) in order to obtain habitat quality scores for each assessment unit/site and offset area. These habitat quality scores will be updated and reported after each scheduled monitoring event.
- Weed infestations to be targeted, estimated cover and locations across the offset areas
  - The baseline survey report will provide the species, percentage cover/density or stems/area and rating of abundance, and offset sites they occur on for non-native flora species known to restrict the movement or adversely impact on available habitat of the black-breasted button-quail (from representative quadrat sites across the offset areas).
- Results of direct and indirect black-breasted button-quail surveys, including camera trapping results
  - Presence of black-breasted button-quail will be confirmed where data obtained, with locations and numbers of records provided.
- Pest species present, numbers and locations recorded
  - To be able to demonstrate a reduction in pest abundance (i.e. the number, species and distribution) of target pest fauna, data gathered using camera trap, indirect observation transects and sand plot sites will be analysed to identify predator species present, activity/detection levels (as an estimate of numbers present), and locations recorded (estimated distribution) across the offset sites, which can then be compared over time.
  - Results of the pest control program and associated surveillance sites will also provide evidence of reduction in pest numbers in or surrounding the offset sites, as well as movement pathways, den sites and potentially individuals removed that can be identified from camera trap images.
- Areas, disturbances and introduced species distributions to be targeted for active management to meet the ecological outcomes

Figures will be prepared to show baseline/monitoring site locations, additional species records (direct and indirect), targeted weed infestations, evidence of pests, and proposed and continuing active management areas for weed and other disturbances.

The baseline report will also describe the following elements (or refer to relevant sections of this OMP as an attachment):

- Key performance indicators and completion criteria for evaluating the success of the management measures
- Criteria for triggering corrective action
- A program with a timeline to monitor (capable of timely detection of triggers for corrective action) and report on the effectiveness of the management measures, and progress against the performance and completion criteria
- Remediation measures to be implemented where monitoring of the performance criteria indicate failure to achieve the ecological outcomes
- Potential risks to the successful implementation of the management measures and a description of the control measures that would be implemented to mitigate against these risks and residual risk ratings

Monitoring data will be prepared with regard to the DAWE's Guidelines for biological survey and mapped data (2018).

Annual compliance report

The results of baseline and monitoring surveys will be included in the annual compliance reports, as relevant to that year. Baseline data will be compared with monitoring data to demonstrate changes in offset area habitat quality scores and for identifying progress of management actions towards the performance indicators and completion criteria.

Results of the weed control program, pest control program and supplementary planting will be included in the annual compliance report, as relevant, including control and maintenance activities undertaken on-site and follow-up treatments/monitoring conducted.

5.5 Offset delivery

5.5.1 Ecological Outcomes

For the black-breasted button-quail offset areas, the aim of this OMP is to achieve the following ecological outcomes for the duration of the approval:

- For the duration of the approval, ensure no net loss in the quality and extent of black-breasted button-quail habitat within the black-breasted button-quail offset areas compared to the baseline survey data
- Demonstrate the following reductions in weed infestation compared to the baseline data:
  - 50% reduction within 3 years of baseline surveys of the black-breasted button-quail offset areas
  - 90% reduction within 10 years of baseline surveys of the black-breasted button-quail offset areas
- Demonstrate a reduction, maintained for 10 consecutive years from baseline surveys of the black-breasted button-quail offset areas, in pest abundance compared to the baseline data

5.5.2 Performance indicators and completion criteria

To determine progress towards the ecological outcomes, compared to the baseline data collected, and to determine completion of the offset, the black-breasted button-quail offset areas will be measured against the performance indicators and completion criteria shown in Table 5-3.

Table 5-3 Performance indicators and completion criteria for black-breasted button-quail offset areas

Ecological outcome	Performance Indicator 1	Performance Indicator 2	Completion criteria
No net loss in the quality and extent of black-breasted button-quail habitat	• Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent	• Within 5 years of baseline survey, habitat quality and extent has been maintained across the black-breasted button-quail offset areas	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), habitat quality and extent has been maintained across the black-breasted button-quail offset areas
Targeted weed infestations have been reduced	• Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations	• Within 5 years, demonstrate a 90% reduction in targeted weed infestations OR • Additional identified weed infestations have been treated	• Within 10 years (or earlier if demonstrated and negotiated with DAWE), there is a 90% reduction in targeted weed infestations
Demonstrate a reduction in pest abundance for 10 consecutive years	• Within 12 months of legally securing, develop and implement a pest control program	• Within 5 years of baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data	• Within 10 years of baseline surveys, there is a demonstrated reduction in pest abundance compared to baseline data

It is noted that the occurrence of baseline surveys and subsequent monitoring surveys may be amended following approval of legal securing, so that timing of events are comparable across years to demonstrate the condition of the sites and changes that have occurred.

The following sections outline management actions, maintenance activities, monitoring programs, reporting and triggers for remedial action that may be implemented to achieve these outcomes (to be advised by SQP following baseline survey).

5.5.3 Supplementary planting management

Habitat quality will be assessed as part of the baseline survey. For the duration of the EPBC Act approval, it is a requirement that there is no net loss in the quality and extent of black-breasted button-quail habitat within the offset areas compared to the baseline survey data.

As part of the weed control program, replacement of lantana thicket with native vine understorey has been proposed where habitats for black-breasted button-quail, koala and/or Lowland Rainforest TEC intersect. Where patches of lantana are treated, supplementary planting will be undertaken to maintain and improve the habitat quality for the black-breasted button-quail.

Following the collection of baseline data, locations for replacement vine understory plantings will be selected. Revegetation works should be undertaken with regard to the South East Queensland Ecological Restoration Framework (Chenoweth EPLA and Bushland Restoration Services, 2012).

The supplementary planting activities, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 5-4, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 5-4 Supplementary planting management – black-breasted button-quail offset areas

Supplementary planting management
Ecological outcomes
-No net loss in the quality and extent of black-breasted button-quail habitat
Management
-All works to be undertaken under direction of a SQP with appropriate qualifications and certifications in accordance with appropriate guidelines and standard methods, as relevant. -Results of baseline surveys to be used to identify weed control areas that may require supplementary planting with native vine understorey species, particularly where there is evidence of black-breasted button-quail activity. Isolated individuals of lantana may not require replacement with native vine species where there is sufficient vine thicket habitat in the surrounding vegetation. Lantana control must be planned so that adequate habitat is retained adjacent to treated areas. Where there is evidence of active black-breasted button-quail foraging or other activity, treat lantana in-situ by cutting the stems and painting with herbicide to leave the structure of the lantana thicket. -Access to planting areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within legally secured black-breasted button-quail offset areas habitat. Areas to be planted should be located in relatively accessible locations or close to existing access tracks to enable maintenance activities to be undertaken. Vehicle access may occur through or along the edges of cleared or regrowth areas. -Supplementary planting should commence within one year of legally securing the offset areas, or as seasonal timing allows following baseline surveys. -Selection of species for plantings will be based on results of baseline surveys (i.e. mapped remnant regional ecosystem, existing vegetation community characteristics and locally occurring native vine understorey species). Species selection and placement will be dependent on local landforms, habitat features and other site characteristics (e.g. waterways, steepness of slopes, geology and soil type). -Plant native vine understorey species as soon as possible following initial lantana treatment. Sites to be planted with native understorey species in a mosaic around the lantana to ensure habitat is preserved. The native plants are to be maintained until established (requiring no further direct maintenance). Further staged removal and replanting can continue in surrounding areas provided adequate habitat is retained adjacent to lantana to be removed/treated. -Replanted areas should be of a density that will eventually achieve a vegetation structure similar to that of surrounding black-breasted button-quail habitat. This may require a greater number to be planted than ultimately required in order to allow for a potential loss of up to 20% of plantings, particularly if structure of dead lantana is not retained in-situ. -Tubestock shall be from locally or regionally sourced seeds, where available, with no evidence of poor condition, growth or root systems. -Immediately prior to and following planting, an inspection and maintenance schedule shall be implemented to provide adequate watering, weed control and replacement of stock, as necessary. -Tubestock and planting holes to be watered prior to and immediately after planting, with ongoing watering maintenance to be scheduled in the planting program -The following watering program is to be implemented, with consideration of prevalent conditions and recent or forecast rainfall: o Watering immediately prior to and post planting (as specified above)

Supplementary planting management
○ Once per week for up to three months (two months if wet conditions; three months if dry conditions) ○ Increased frequency or total duration may be required if heatwave or prolonged dry conditions experienced - Mulch and/or tree guards to be installed if required for the species, location, existing fauna or exposure (to be specified in the planting program). Tree guards to be removed after plants established - Inspections and maintenance (i.e. direct applications such as watering, mulch, pesticide, fertiliser) to be scheduled (at a minimum): ○ Monthly for the first six months after planting ○ Every three months between six and 12 months after planting ○ Every six months in the second and third year after planting - Inspections and maintenance will include assessment of survival with plant replacement to occur where >20% mortality of plantings experienced. Species selection is to be reviewed/modified if continued failure is observed in one or more species. Any wide gaps in planted areas (e.g. lack of understory vine thicket habitat created) due to plant mortality must be investigated, ameliorated and replanted. Survival rate will be monitored at the following frequencies (can be undertaken in conjunction with scheduled inspections): ○ Every six months in the three years after planting - Areas to be planted will require inspections and follow-up maintenance activities if initial weed treatment or removal of other disturbances has been undertaken. Inspections and maintenance for weed treatment or other disturbance can be found in the weed management measures in Section 5.5.4 and land use and access management in Section 5.5.6. - Areas to be naturally regenerated will require inspections and follow-up maintenance activities if initial weed treatment or removal of other disturbances has been undertaken. - Inspection and maintenance activities (or other works) shall be recorded on a checklist, including details of plant replacement and general observations of plant health and growth, weed introduction or spread, seedling recruitment, evidence of insect damage or plant pathogens, evidence of additional disturbance, threats or land degradation, general site observations, weather records. - Minor clearing or disturbance of native vegetation within or adjacent to the planting or regeneration areas may be required to enable access to planting areas, for site establishment or to maintain fences, firebreaks, access tracks or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist. - Photographs and GPS data to be taken during site preparation, planting, weed treatment, inspection and maintenance works - Contractor to notify TMR of any major works (e.g. clearing for new infrastructure or tracks) prior to undertaking - Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the black-breasted button-quail), or non-compliance (of management actions or conditions of approval) occurs

Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP with site-specific information Modification of management actions or monitoring program if necessary

Supplementary planting management			
Survival rate	Every six months for three years after planting	>20% loss of plantings	Investigate and address (if possible) cause of mortality, if evident (e.g. drought conditions, stock trampling, vehicle access). Replacement of plants in same manner as initial plantings and maintenance Review species selection or planting methods if failure occurring in one or more species Increase frequency of maintenance and inspections, if required Replacement of plants if significant gaps due to plant mortality
Inspections and maintenance of plantings will be recorded (checklist)	Monthly for the first six months after planting Then every three months up to one year after planting Then every six months in the second and third year after planting	Reduced condition or health of plantings Weed introduction or spread Evidence of pests or plant pathogens on new plantings Additional disturbances	Increase frequency of inspections and maintenance for a period of one year Conduct weed treatment, as appropriate Apply pesticide or other treatment as appropriate to pest/pathogen, having regard to any sensitive habitats present Take action to remove additional disturbance and prevent further disturbances, as appropriate
Scheduled monitoring event (in accordance with baseline and monitoring survey program)	Years 1, 3 and 5 for up to 5 years after baseline survey If outcomes not demonstrated at 5 years, an additional monitoring event will be scheduled at 10 years.	Reduction in black-breasted button-quail habitat quality or extent Reduced presence of individuals (through direct or indirect evidence) Additional threats requiring management action No evidence of species utilisation in replanted areas. No increase in species utilisation across the offset areas.	Review weed and pest fauna control programs, and land use activities and management, and increase control measures if required Management of additional threats observed Increase plantings or move planting areas to improve habitat connections Consider increased frequency of monitoring prior to 10 year event in order to demonstrate outcomes earlier with additional management in place
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**

Supplementary planting management			
Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent	Monitoring/compliance report to compare against baseline data and determine progress towards criteria	At the 12 month milestone, if monitoring program has been implemented, project can progress as scheduled.	If monitoring program has not been developed or implemented within 12 months of baseline survey, undertake monitoring event as soon as possible. Implement process to ensure future monitoring events are undertaken on schedule. DAWE is to be notified accordingly.
Within 5 years of baseline surveys, habitat quality and extent has been maintained across the black-breasted button-quail offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if habitat quality and extent is the same or better than baseline data across the offset areas, completion criteria has been met (if demonstrated and negotiated with DAWE). No further requirements..	If habitat quality or extent has reduced, site-specific details should be investigated using the annual monitoring survey results. Review of any errors in data due to observer bias or conditions on site. Review of planting species, locations and management measures. Undertake additional active management if required to meet completion criteria Review/increase frequency of monitoring events if progress towards performance or completion criteria is not demonstrated. DAWE is to be notified accordingly.
Within 10 years (or earlier if demonstrated and negotiated with DAWE), habitat quality and extent has been maintained across the black-breasted button-quail offset areas	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if habitat quality and extent has been maintained across the black-breasted button-quail offset areas, completion criteria has been met. No further requirements.	If habitat quality and extent has not increased across the black-breasted button-quail offset areas, the program shall be extended by periods of 12 months until the criteria is met. Review methods for monitoring survey and data analysis is consistent with previous monitoring events. Review of site conditions or other contributing factors. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, plan supplementary planting (species, locations, staging), modify monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey
Record of site/maintenance works (Appendix E)	Record of site works and management actions, including inspections and maintenance.		Following site works or scheduled inspection/ monitoring event

Supplementary planting management		
	On-site checklist may be used for inspection events and maintenance undertaken on site. Activities may be summarised in compliance report.	
Monitoring report	Reporting will summarise methods, field data, comparison against baseline and previous years and progress towards the performance or completion criteria. Report to include maps, photographs and all relevant data. Results to be summarised or included in annual compliance report.	Years 1, 3 and 5 Then at year 10 (unless demonstrated earlier)

5.5.4 Weed management

Within 3 years of baseline surveys of the black-breasted button-quail offset areas, weed infestations must be reduced by 50% compared to baseline data, and within 10 years of baseline surveys of the black-breasted button-quail offset areas, weed infestations must be reduced by 90% compared to baseline data.

This weed control program will also assist in achieving the ecological outcome of no net loss in the quality and extent of black-breasted button-quail habitat.

Target weed infestations include species that are known to restrict the movement or adversely impact on available habitat of the black-breasted button-quail across the landscape. The surveys undertaken as part of the preparation of the Preliminary Documentation phase identified the following weeds on the offset sites that may restrict the movement or adversely impact on available habitat of the black-breasted button-quail:

- Cat's claw creeper (*Macfadyena unguis-cati*)
- Lantana (*Lantana camara*)

Other weeds were observed (refer to Section 5.3.2), however may not be adversely impacting habitat of the black-breasted button-quail. Baseline surveys (undertaken by a SQP) will provide additional and more detailed information regarding the species, abundance and distribution of weed infestations, to be updated within this OMP and subsequent weed control program. Following the baseline survey, a weed control program will be developed and implemented to enhance the quality of the black-breasted button-quail habitat.

Methods for weed control will be site-specific and appropriate to each species, with regard to best practice and relevant guidelines, such as:

- South East Queensland Ecological Restoration Framework (Chenoweth EPLA and Bushland Restoration Services, 2012)
- Local government biosecurity plans
- Biosecurity Queensland fact sheets

Methods may involve a combination of physical, chemical and/or biological methods, depending on the species and extent of infestations. Some species may require subsequent treatments due to viability of seed banks for longer periods. Appropriate minor use permits from the Commonwealth Australian Pesticides and Veterinary Medicines Authority may apply.

Weed management will be undertaken within black-breasted button-quail offset areas for koala habitat, therefore weed management of black-breasted button-quail habitat within these sites must be coordinated with weed management for these other habitats. In particular, these offset areas contain some lantana understorey vegetation or thickets, which can provide shelter habitat for the black-breasted button-quail, therefore a program of gradual, staged replacement of lantana thicket with native vine understorey will be implemented at these sites (rather than immediately treating all lantana infestations) in order to maintain and replace habitat for this fauna species.

Native vegetation clearing that may be required within offset areas for the purposes of undertaking weed management includes:

- Clearing that is necessary for maintaining infrastructure including fences, roads, vehicular tracks, water facilities and constructed drains
- Clearing vegetation within a watercourse
- Clearing for a necessary fence, road or vehicle track up to 10 m wide
- Clearing to reduce hazardous fuel loads and to establish fire breaks

The weed management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 5-5, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 5-5 Weed management – black-breasted button-quail offset areas

Weed management
Ecological outcomes
-Targeted weed infestations have been reduced -No net loss in the quality and extent of black-breasted button-quail habitat
Management measures
-A weed control program will be developed and implemented by an experienced and qualified weed control specialist contractor that uses site-specific information from baseline surveys to target weed infestations, describe methods of treatment and an inspection and maintenance schedule. Control methods are to be undertaken in accordance with appropriate guidelines and standards, including the Queensland Government Biosecurity Fact Sheets for each species. TMR to be provided with weed control program prior to initial treatment. -Where weed infestations occur, treatment or removal of the disturbance will commence within one year of legally securing the offset area in order to allow for natural regeneration of these areas or replanting with native vine understorey species (as described below and in Section 5.5.3). -Initial treatment of infestations will target key species (i.e. lantana, cat's claw creeper), focussing on higher value areas first (e.g. areas with higher black-breasted button-quail activity) working out towards more disturbed and cleared areas. Where possible commence control in areas of light infestations and work towards dense infestations using a mix of controls, as appropriate to the species and landscape. Additional key species to target may be identified during baseline surveys. -Staged removal of lantana infestations within the black-breasted button-quail offset areas will be undertaken with selective, gradual replacement using appropriate native vine understorey species to maintain and replace habitat values for the black-breasted button-quail (while still providing for movement of the koala within the koala offset areas). A method and proposed locations for this staged replacement will be developed following baseline surveys, using results of surveys for selecting locally endemic vine understorey species. This replacement, or supplementary planting, is further discussed in Section 5.5.3. -Isolated individuals of lantana may not require replacement with native vine species where there is sufficient native vine thicket habitat in the surrounding vegetation. Lantana control must be planned so that adequate habitat is retained adjacent to treated areas. Where there is evidence of active black-breasted button-quail foraging or other activity, treat lantana in-situ by cutting the stems and painting with herbicide to leave the structure of the lantana thicket. Plant native vine forest species as soon as possible following initial treatment (refer to Section 5.5.3). -Control of **lantana** may include a combination of methods, such as: ○ Physical control by hand cutting or slashing, or selective clearing using remote control slasher/mulcher (with follow-up spot spray for regenerating stumps or seedlings as seeds can remain viable for four years and seedlings may mature after one year) ○ Herbicide control: ▪ Recommended herbicide agents are provided in the Queensland Government Biosecurity Fact Sheet for Lantana for chemical types, rates and application method. ▪ Basal bark spraying and cut stump methods are appropriate for single stemmed lantana. ▪ Herbicide spraying of plants less than 2m high requires overall spraying of foliage to the point of run-off. Foliar spraying is not recommended within sensitive environments or adjacent to native seedlings or tubestock plantings.

Weed management

- Biological agents have been used to treat lantana infestations and are listed in the Queensland Government Biosecurity Fact Sheet for Lantana.

- Control of **cat's claw creeper** can be undertaken in a number of different ways depending on the nature and extent of the infestation and the time of year. A combination of methods can be adopted, including:
  - Physical control methods – cut all stems/leaders
  - Herbicide control – treat cut stumps/stems with spray/paint applied (cut stump method). Refer to Queensland Government Biosecurity Fact Sheet for Cats Claw Creeper for chemical types, rates and application method. Likely to require repeat follow-up herbicide application due to numerous tubers that typically regrow. Regrowth must not reach host tree canopy. Foliar spraying is not recommended within sensitive environments or adjacent to native seedlings or tubestock plantings.
  - Biological control – release of tingid bug *Carvalhotingis visenda*, the moth *Hypocosmia pyrochroma* or the leaf-mining jewel beetle *Hylaeogena jureceki*
- Inspections and maintenance will be undertaken that includes observations on success of previous treatments in terms of extent, abundance and any regrowth of weed infestations, new weed introductions or spread, additional disturbances, follow-up treatment such as spot-spray of new shoots and removal of seedlings. Inspection and maintenance activities (or other works) shall be recorded on a checklist. The following inspection and maintenance program is to be implemented, with consideration of prevalent conditions and recent rainfall:
  - Initial treatment of targeted weed infestations within six months of baseline surveys
  - Inspection of targeted areas and follow-up treatment every three months in the first year after initial treatment
  - Inspections and follow-up treatment every six months in Years 2 and 3 after initial treatment
  - Scheduled inspection and follow-up treatments once in Years 4 and 5 after initial treatment
  - Additional monitoring for new introductions or spread of target species during scheduled monitoring surveys, with TMR to be notified of additional treatment to occur
- Photographs and GPS data to be captured during control works
- Access to weed management areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the black-breasted button-quail habitat on offset areas.
- Minor clearing or disturbance of native vegetation within or adjacent to the black-breasted button-quail offset areas may be required to enable access to weed management areas or to maintain fences, firebreaks, access tracks or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist.
- Contractor to notify TMR of any major works (e.g. clearing of a larger area of native vegetation for weed management purposes) prior to undertaking
- Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the black-breasted button-quail), or non-compliance (of management actions or conditions of approval) occurs

Weed management			
Monitoring			
Monitoring aspect	**Monitoring frequency**	**Trigger for remedial activities**	**Potential remedial activities**
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP and weed control program with site-specific information
Inspections and maintenance of targeted weed infestations	Every three months for the first year after initial treatment Then every six months in Years 2 and 3 after initial treatment Scheduled inspection and follow-up treatments once in Years 4 and 5 after initial treatment	New weed infestations or spread of existing infestations Additional disturbance that might lead to new infestations Reduction in available vine thicket habitat following lantana treatment Regrowth of treated cat's claw creeper present on cut vine or reaching near to host tree canopy	Update of control program methods and locations Conduct additional weed treatment, as appropriate Modification of supplementary planting methods or species Increase frequency of inspections and maintenance if new weed infestations require treatment Remediation of additional disturbances and prevention of further disturbance
Scheduled monitoring event (in accordance with baseline and monitoring survey program)	Years 1, 3 and 5 for up to 5 years after baseline survey If outcomes not demonstrated at 5 years, an additional monitoring event will be scheduled at 10 years.	Increased extent of weed infestation in targeted areas (species density/cover) Reduction in available vine thicket habitat following lantana treatment	Review results of weed control program and supplementary planting, and amend methods as required If weed infestations have not been reduced by Year 5, undertake additional treatment schedule. Extend program on a 12-monthly basis until outcome is demonstrated. Notify DAWE accordingly.
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations	Monitoring/compliance report to compare against baseline data and determine progress towards performance	At 3 years, if a 50% reduction in targeted weed infestations has been demonstrated, project can progress as scheduled.	If 50% reduction has not been demonstrated the program shall be extended by periods of 6 months until the criteria is met. If weed treatment has not been successful, or evidence of new target species or spread, review methods in weed control program and undertake

Weed management			
			an additional round of weed treatment of the same areas, potentially using different methods as appropriate. Increase inspection and treatment frequency if necessary to achieve criteria. DAWE is to be notified accordingly.
Within 5 years, demonstrate a 90% reduction in targeted weed infestations OR additional identified weed infestations have been treated	Monitoring/compliance report to compare against baseline data and determine progress towards performance and completion criteria	At 5 years, if targeted weed infestations have been reduced by 90%, completion criteria has been met (if demonstrated and negotiated with DAWE). No further requirements. OR additional weed infestations identified have been treated, project can progress as scheduled.	If targeted weed infestations remain present or have spread to new areas, review methods in weed control program and undertake additional treatment. Increase inspection and follow-up treatment frequency. DAWE is to be notified accordingly.
At 10 years (or earlier if demonstrated and negotiated with DAWE), there is a 90% reduction in targeted weed infestations	Monitoring/compliance report to compare against baseline data and determine progress towards completion criteria	At 10 years (unless demonstrated earlier), if a 90% reduction in targeted weed infestations has been achieved, completion criteria has been met. No further requirements.	If a 90% reduction has not been achieved the program shall be extended by periods of 6 months until the criteria is met. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, prepare weed control program, modify monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey
Weed control program	Design and implementation schedule for control of targeted weed infestation areas. Provided to TMR prior to initial treatment.		Post-baseline survey
Record of site/maintenance works (Appendix E)	Record of site works and management actions, including inspections and maintenance.		Following site works or scheduled inspection/ monitoring event

Weed management		
	On-site checklist may be used for inspection events and maintenance undertaken on site. Activities may be summarised in compliance report.	
Annual monitoring report	Reporting will summarise methods, field data, comparison against baseline and previous years and progress towards the performance or completion criteria. Report to include maps, photographs and all relevant data. Results to be summarised or included in compliance report.	Years 1, 3 and 5 Then at year 10 (unless demonstrated earlier)

5.5.5 Pest animal management

The pest animal control program is required to demonstrate a reduction in pest abundance, maintained for 10 consecutive years from baseline surveys of the black-breasted button-quail offset areas, compared to the baseline data. Pest abundance is defined as the number, composition and distribution of non-native vertebrate animals known to predate on the black-breasted button-quail.

Baseline surveys (refer to Section 5.4) will aim to identify pest animals present that are known to predate on the black-breasted button-quail across the offset sites. Baseline surveys will be undertaken by a SQP for black-breasted button-quail and pest expert, and will record the following data through camera traps, indirect observation transects and passive monitoring sand plots:

- Target pest fauna species present, numbers recorded (represented by activity/detection levels) and locations recorded

A number of threats to the black-breasted button-quail from feral animals have been identified in literature, including degradation of habitat and predation by feral pigs (*Sus scrofa*) and predation by cats (*Felis catus*), wild dogs (*Canis familiaris*) and foxes (*Vulpes vulpes*). A pest animal control program will be undertaken at the offset site that will target cats, foxes, wild dogs, and pigs. The program may also consider properties within a radius of approximately 5 km of the offset sites. The program will be managed by TMR using contractors with the expertise, qualifications and knowledge to best achieve the outcomes for the project. The contractors will undertake a program of target pest surveillance and control prior to undertaking any control works, and reporting documenting the outcomes of the baseline surveys, annual monitoring and pest control program.

The control program will be developed in detail following the completion of the baseline survey. The pest animal management actions, monitoring, triggers for remedial action, compliance criteria and reporting are provided in Table 5-6, to be undertaken as relevant to the site following baseline surveys and as advised by the SQP to achieve the ecological outcomes.

Table 5-6 Pest animal management – black-breasted button-quail offset areas

Pest animal management
Ecological outcomes
-A reduction in pest abundance for 10 consecutive years
Management measures
-A pest control program will be designed, and refined using information obtained from the baseline survey (and other available data sources), and will include the identification of pest species to be targeted (namely, wild dog, cat, fox and pig), likely habitat and movement corridors (including any hot-spots of activity), land parcels and stakeholders participating in control program, timelines and restrictions, the locations and types of pest surveillance sites and an indication of potential control sites, methods of control, and reporting processes. These aspects are further outlined below, but are subject to change following baseline survey and ongoing surveillance. -The pest control program is to be provided to TMR prior to commencing operations -The pest control activities may be undertaken: o On an ongoing basis (as needed and indicated by surveillance sites to be set up) for an initial period of three years within 5 km radius of the offset areas o On a minimum six-monthly basis (or more if pest surveillance sites record increased activity levels or other opportunistic observations) for an additional seven years (total of 10 years after baseline surveys) within 5 km radius of the offset areas o On an extended basis if the completion criteria has not been met (i.e. 10 years of consecutive reduction in pest abundance) -Contractor will undertake on-ground evaluation/surveillance of 'hot spots'. This may include the use of cameras, sand-plots, scat assessment, detection dog evaluation and other non-animal disturbing techniques, to establish locations for effective and efficient control activities. These may be located on non-offset land and will be in addition to annual monitoring events on offset sites. A number of surveillance sites will be established throughout the study area (5 km radius of the black-breasted button-quail offset areas) that record species, activity and numbers of animals, which will assist data analysis and success evaluation throughout the pest control program. Individuals of target species may potentially be identified, and able to be cross-checked with animals removed. -The Contractor will undertake ongoing assessment of surveillance data, control activities and stakeholder feedback. On-ground control work may be altered based on assessment of this data, and control works may not be conducted in areas where activity is low or non-existent. -Estimates of pest species detection level or activity level and distribution over the offset sites will be provided to TMR on an annual basis. This will be analysed from annual monitoring data and supplementary data from pest surveillance sites and control activities, and compared to baseline data. -Initial control sites will be discussed with Contractor/TMR (and any other landholder) based on level of activity and viability (safety, efficacy etc). For access to land: o No monitoring or control works will be carried out on offset land or non-offset land unless Landholder Agreements have been signed by relevant landholders. Consultation and/or notification may be required with tenants on TMR-owned offset lots. o Any 'Permits to Operate' on State Land will be sought in conjunction with the Landholder Agreement Process. No work will be carried out on State Land until such time as these permits are received and forwarded to TMR for reference. o Neighbour Notifications (of upcoming control works) will be required in most rural instances. Where the area may be peri-urban, TMR/Contractor will undertake the notification process to ensure reduced risk to domestic animals.

Pest animal management

- All participating properties with control sites will have 'Warning' signage established prior to any activities occurring within the property. These will be visible from any access points.

-On ground pest animal control may include the use of the following techniques (dependant on safety of use, stakeholder restrictions, type of animal targeted, non-target capture risks etc):

- Soft-jaw foot-hold trapping – This will be the primary technique used for targeting wild dogs. Target specific scent lures are used, along with specialist assessment of placement for optimising capture results (and reducing off-target risks).
- Cage Trapping – Small, medium, large and pen/yard traps, with or without real-time trail camera monitoring allowing for remote telemetry and gate activation. Pre-feeding, food and scent lures will be used to target various species.
- Free-shooting – opportunistic free-shooting with the appropriate calibre firearm may be utilised where participating stakeholders have agreed (indicated on signed Agreement Forms).

-The relevant procedures and permits for euthanasia and risk assessment for firearms will be followed at all times.

-The contractor will recover and remove all carcasses, unless an appropriate and alternative arrangement is agreed upon with the participating landholder (e.g. has equipment to dig deep burial pit) or the recovery of carcass/s is deemed too difficult (OH&S restrictions).

-All control works, including the use of a firearm, will be required to be undertaken by a suitably qualified person in accordance with a firearm safety risk assessment and all relevant procedures, permits, licences and legislative requirements.

-Photographs and GPS data to be captured during control works

-Results of the pest control program will be provided six-monthly during the first three years (half yearly interim report and yearly full report) and yearly for the remaining seven years), and will include pest surveillance site types, locations and results, on-ground control activities (species, numbers, methods of control/removal), and communications with stakeholders, as a minimum.

-Any complaints received from the public or stakeholders regarded this pest control program will be immediately reported to TMR.

-Access to pest monitoring or control sites to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the black-breasted button-quail habitat on the offset areas.

-Minor disturbance of native vegetation within or adjacent to the black-breasted button-quail offset areas may be required to enable access to monitoring, pest surveillance or control sites or to maintain fences, access tracks or infrastructure associated with pest surveillance or control works. Minor works are to be recorded

-Contractor to notify TMR of any major works (e.g. clearing of a larger area of native vegetation for pest management purposes) prior to undertaking

-Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the black-breasted button-quail), or non-compliance (of management actions or conditions of approval) occurs

Monitoring

Monitoring aspect	Monitoring frequency	Trigger for remedial activities	Potential remedial activities
Baseline survey event	Within six months of legally securing	Additional site-specific information	Update of OMP and pest control program with site-specific information

Pest animal management			
Pest surveillance sites – on and within 5 km radius of offset sites	Ongoing surveillance at selected locations of high activity (hot spots), with potentially changing locations. Six-monthly reporting of surveillance and pest control activities and results for the first three years (half-yearly interim report and yearly full report) Then annually for 10 years after baseline survey (combined with annual monitoring results to demonstrate reductions in pest abundance)	Limited control being undertaken due to lack of detection Significant increase in pest activity in an area	Review location and frequency of surveillance and controls and modify as required. Move monitoring sites to different potential hot spot or modify surveillance type/method. Increase frequency or modify methods of control activities (greater focus on areas close to offset sites, if necessary). Review methods of data analysis and interpretation. Determine if activities are being undertaken in neighbouring properties which may impact activity, or if there is a climatic, seasonal or other reason that may be causing increase in activity. Focus control operations on areas of increased activity as appropriate. Identify options for remedial action and consult with DAWE as required.
Annual monitoring event (in accordance with baseline and monitoring survey program) – on offset sites	Annually for 10 years after baseline survey	No demonstrated reduction in estimated pest activity or detection	TMR/Contractor to review pest control program efficacy and modify as per above. Review methods of data analysis and interpretation. Increase frequency or modify methods of control activities (greater focus on areas close to offset sites, if necessary). Potentially increase frequency of monitoring and locations on offset areas after first year, if no reduction demonstrated.
Performance and completion criteria			
Criteria	**Reporting**	**Compliance**	**Potential remedial activities**
Within 12 months of legally securing, develop and implement a pest control program	Pest control program report to be provided to TMR prior to undertaking control works. Details to be included in annual compliance report	At 12 months, if pest control program has been developed and commenced, project can progress as scheduled.	Develop and implement pest control program immediately in order to commence 10 year control and monitoring program. DAWE to be notified if commencement delayed.
Within 5 years after baseline surveys, there is a demonstrated reduction in	Annual monitoring report to compare against baseline data and determine progress towards performance and	At 5 years, if a reduction in pest abundance has been demonstrated compared to	If no reduction evident in first year after baseline surveys, consult with TMR and review methods of surveillance and control, as well as monitoring

Pest animal management			
pest abundance compared to baseline data	completion criteria. Details to be included in annual compliance report.	baseline data, project can progress as scheduled.	sites and methods within offset areas. Review data analysis and interpretation methods to determine cause of non-compliance and possible solutions. Include consideration of any external causes of non-compliance (i.e. beyond TMR's control). Determine if it can be managed through increased or modified control methods. Identify options for controls. Provide explanation if cause of non-compliance is beyond TMR's control (e.g. climatic, seasonal variation, off-site activities). Consult with DAWE as required.
At 10 years after baseline surveys, there is a demonstrated reduction in pest abundance	Annual monitoring report to compare against baseline data and determine progress towards completion criteria. Completion data to be provided in compliance report.	At 10 years, if a reduction in pest abundance has been demonstrated compared to baseline data, completion criteria has been met. No further requirements.	If a 10 year reduction compared to baseline data has not been achieved, review data analysis and interpretation methods to determine cause of non-compliance and possible solutions. Include consideration of any external causes of non-compliance (i.e. beyond TMR's control). Review pest control methods, schedule, monitoring and data analysis. Modify pest control program accordingly. If no anomalies identified, the program shall be extended by periods of 12 months until the criteria is met. DAWE is to be notified accordingly.
Reporting			
Report type	**Report details**		**Frequency**
Baseline survey report	Site-specific information for offset areas, to be used to update OMP, prepare pest control program, select method and placement of surveillance sites, modify annual monitoring methods if necessary. To be summarised in annual compliance report.		Post-baseline survey
Pest control program	Design and implementation schedule of pest control program, including target species and areas/locations, general timing of surveillance and control works, data analysis, demonstration of outcomes, remedial measures and reporting process. Provided to TMR prior to commencing control activities.		Post-baseline survey

Pest animal management		
	Summarised in annual compliance report.	
Pest control program reports	Results of pest surveillance data and control activities to be provided to TMR. Control and surveillance activities will be altered based on ongoing assessment of this data by the pest control contractor. Shall include maps showing locations, and other relevant data.	Six-monthly for the first three years (half-yearly interim report and yearly full report) Then annually up to 10 years after baseline survey
Annual monitoring report	Report to TMR will include methods, field data, comparison against baseline data, including estimates of target pest species activity/detection levels and distribution over the offset areas. Report to include maps, photographs and all relevant data. Inclusion of relevant data from pest control program reports. Progress towards the performance and completion criteria is to be analysed and reported. Results to be summarised in annual compliance report.	Annually

5.5.6 Land use and access

For the duration of the approval, no net loss in the quality and extent of black-breasted button-quail habitat within the offset areas compared to the baseline survey data will be achieved. Following baseline surveys, the OMP will be updated to include site-specific land management actions and locations of existing and proposed infrastructure, signage, and maintenance requirements.

Significant works shall commence within 6 months of baseline surveys.

A record of site works, inspection events and maintenance undertaken on site will be maintained (Appendix E). Inspections and monitoring may be undertaken biennially with scheduled monitoring events, and summarised in compliance reporting. Inspections may include observations of rubbish, public access, pest animals, damage to infrastructure, firebreak or other infrastructure maintenance requirements, or additional threats, disturbance or land degradation to be remediated.

There are residences adjacent to the BBBQ-OA1 and the BBBQ-OA2 offset areas, which may have tenants present that will be restricted from undertaking any land use beyond their immediate cleared yard area. No dogs will be allowed on site.

Land management actions may include:

- Restriction of vehicles to established access routes or defined access points. Access tracks needed for site management activities to be restricted to site personnel with a locked gate/barrier. Any unneeded access tracks to be permanently closed and identified for rehabilitation, if appropriate.
- Exclusion of domestic/livestock animals from the offset areas will be established through installation or repair (and maintenance) of fencing bordering residences, access points, and/or adjoining paddocks, as appropriate.
- Fauna exclusion fencing will be installed where the offset areas adjoin the Bruce Highway road corridor to prevent fauna injury and/or mortality from vehicle. This will be carried out as part of construction of the road corridor. A three-metre clear zone is required to be maintained either side of the fauna exclusion fence that will border the proposed road corridor.
- Fences that pose a risk to black-breasted button-quail or other native fauna (e.g. barbed wire fences) or restrict movement within and between habitats will be removed or replaced. Any fences erected or replaced will be black-breasted button-quail friendly to allow for movements into and through habitat areas. Fencing will be maintained annually as needed, or as appropriate given site conditions or weather events.
- Where fencing is deemed to not be appropriate, signs will be erected that prohibit public access into the black-breasted button-quail offset areas and, in particular, the active weed management, pest monitoring/control sites, natural regenerating and planting areas.
- All rubbish will be removed from the offset areas and disposed of off-site.
- Existing internal and external fire breaks will be maintained, as appropriate.
- Erosion control will be installed if evidence of soils loss or sedimentation of downstream waterways is identified. Any installed erosion control measures will be maintained as needed.
- Photographs and GPS data to be captured during control works
- Access to land use management areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed within the black-breasted button-quail habitat areas
- Minor clearing or disturbance of native vegetation within or adjacent to the offset areas may be required to enable access to land management areas or to maintain fences, firebreaks, access

tracks, erosion control or infrastructure such as constructed drains. Minor works are to be recorded in the inspection and maintenance checklist.

- Contractor to notify TMR of any major works (e.g. clearing of an area of native vegetation for land use or access purposes) prior to undertaking
- Contractor to notify TMR immediately if any incident (that does or has the potential to impact on the black-breasted button-quail), or non-compliance (of management actions or conditions of approval) occurs

5.5.7 Other management actions

Bushfire management

Some of the offset area borders the Woondum State Forest in Woondum, which are actively managed for forestry purposes by DES. Liaison and planning with DES on an annual basis is advised to achieve effective fire management outcomes for the offset areas, particularly adjacent these heavily wooded areas.

Any controlled burns or management activities will be undertaken as required in consultation with local council, the rural fire brigade and/or Queensland Fire and Emergency Services. It is not recommended to undertake controlled burns within existing black-breasted button-quail habitat.

Vegetation clearing activities that may be required to reduce the risk of bushfires within and adjacent to the offset areas include:

- Clearing for a firebreak or necessary fire management line up to 10 m wide in areas adjoining the black-breasted button-quail habitat and/or during an imminent bushfire emergency to preserve remainder of the habitat areas
- Clearing to remove risk of personal injury or damage to infrastructure
- Reducing hazardous fuel loads under the *Fire and Emergency Service Act 1990*
- Clearing that is necessary for maintaining infrastructure including fences, roads, vehicular tracks, water facilities and constructed drains

A three-metre clear zone is required to be maintained either side of the fauna exclusion fence that will border the proposed road corridor to ensure its efficacy. This clearing also operates as a fire break.

The black-breasted button-quail offset areas will be managed to reduce the risk of impacts from bushfire, through a targeted weed control program (refer to Section 5.5.4) and land use management and maintenance of existing internal and external fire breaks (refer to Section 5.5.6).

Flood management

There may be areas of localised flooding or ponding in some parts of the offset areas. Baseline surveys will seek to identify areas showing evidence of inundation along or adjacent waterways, through debris, damage, or changes in species/community or structure present.

Supplementary planting, weed management and land use and access management actions will consider the impact of periodic inundation on the activities to be undertaken in such areas, and their likely effectiveness, as well as the timing of such activities.

Should management actions be impacted by inundation, the OMP will be reviewed and modifications to management activities and locations will be undertaken accordingly.

5.6 Auditing and review

Following baseline surveys, management measures in the OMP may be updated to include site-specific requirements, if relevant and appropriate (such as locations of weed infestations to be targeted for weed control, locations of existing infrastructure and proposed maintenance or removal, locations of areas to target for planting, locations of relevant disturbances and threats to be managed/removed, any updates to timing).

The OMP for the black-breasted button-quail will be reviewed following baseline surveys and at Years 1, 3 and 5 after scheduled monitoring events.

Any relevant changes to the timeframes to achieve the performance criteria will be formally submitted to DAWE for approval.

Independent audits will be undertaken upon request by DAWE in accordance with Conditions 23, 24 and 25 of the EPBC approval.

5.7 Compliance reporting

5.7.1 Annual compliance report

An Annual Compliance Report will be prepared that includes the black-breasted button-quail offset areas, as relevant to that year, in accordance with Condition 20 of the EPBC approval and the DAWE's *Annual Compliance Report Guidelines* (2014). The compliance report will include:

- Details of compliance, incidents and non-compliance
- Management actions undertaken within the offset areas and as part of control programs (with associated documentation attached)
- Remediation measures to be implemented where monitoring of the performance criteria indicates failure to achieve required outcomes
- Progress towards and achievement of the ecological outcomes, performance indicators and completion criteria outlined in Section 5.5.2

The results of baseline and monitoring surveys will be included in the annual compliance reports, as relevant to that year. Baseline data will be compared with monitoring data to demonstrate changes in offset area habitat quality scores and for identifying progress of management actions against the performance indicators and completion criteria.

Results of the weed control program and planting program will be included in the annual compliance report, as relevant, including inspections, control and maintenance activities undertaken on-site and follow-up treatments/monitoring conducted.

5.7.2 Reporting non-compliance

Notification in writing to DAWE must be made for any incident, non-compliance with the conditions, or non-compliance with the management action commitments made in this OMP, in accordance with Conditions 21 and 22 of the EPBC approval.

Notification must be made as soon as possible and no later than 5 business days after becoming aware of the incident or non-compliance.

6. Risk framework

An ecological risk assessment was undertaken for each of the identified threats/risks, where each threat/risk was evaluated in terms of the likelihood of occurrence and the potential consequences. The likelihood of occurrence table (Table 6-1) is used to identify the most credible likelihood of an event occurring, while the level of consequence (Table 6-2) is an assessment of what the anticipated impact of the threat/risk would be, either directly or indirectly, to the offset sites. By combining the likelihood of occurrence and consequence, an overall risk rating can be applied to each threat/risk (refer to Table 6-3).

Table 6-1 Likelihood of occurrence

Likelihood	Definition
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 6-2 Level of consequence

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

Table 6-3 Risk matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

The risk assessment in Table 6-4 identifies the current threats/risks to achieving the management intent and outcomes. An initial risk rating is given for the threat in the absence of management measures, with a residual risk rating applied after management measures have been implemented.

Table 6-4 Current risks to achieving management outcomes

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
Weed infestation	Invasive weed species outcompeting TEC, koala and black-breasted button-quail habitat or enhancement plantings	Highly likely	Minor	Medium	Undertake weed control and maintenance as detailed in Sections 4.5.4 and 5.5.4.	Possible	Minor	Low
Insect outbreak/ infestation	A localised insect outbreak in the offset area has the potential to reduce plant growth and/or cause plant mortality via complete or partial plant defoliation or plant stress. Insect outbreaks could alter the species composition of the area ultimately leading to a change in the vegetation community or increasing the time to offset realisation.	Unlikely	Moderate	Low	Regular inspections of plants for symptoms of major insect attack (e.g. plant stress, leaf predation). Upon identification of major insect attack, remedial action should be undertaken at a scale appropriate to the size, extent and intensity of the disturbance.	Rare	Moderate	Low
Disease outbreak/ infestation	The health of the proposed offset area may be influenced by various phytopathogens (such as myrtle rust) which could cause	Possible	Moderate	Medium	Ensure disease free planting stock is used. Limit site access and perform regular inspection of plants for symptoms of disease (e.g. plant stress, leaf discolouration).	Unlikely	Moderate	Low

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
	reduced growth, plant stress, and/or plant mortality on an individual or community level. A disease outbreak could alter the species composition of the area and ultimately lead to a change in the vegetation community or increase the time to offset realisation.				Upon identification of disease or following an outbreak, remedial action should be undertaken at a scale appropriate to the size, extent and intensity of the disturbance.			
Species predation	Predation on black-breasted button-quail and koala by cats, pigs, foxes, and wild dogs, as relevant to the species	Highly likely	Moderate	High	A pest animal control program will be undertaken that will target cats, foxes, wild dogs, and pigs (as appropriate to the offset areas and species present) within approximately 5 km of the offset sites for a period of 10 years.	Possible	Moderate	Medium
Vegetation management	Inappropriate site preparation and/or weed control leading to unsuccessful establishment of koala habitat trees plantings	Possible	Moderate	Medium	A planting program will be developed following baseline surveys, as will a weed control program. Refer to Section 4.5.3 for details on site preparation and planting method.	Rare	Moderate	Low

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
Vegetation management	Inappropriate site preparation and/or weed control leading to unsuccessful establishment of enhancement planting for the black-breasted button-quail	Possible	Moderate	Medium	Refer to Section 5.5.3 for details on site preparation and planting method.	Rare	Moderate	Low
Edge effects and habitat fragmentation	Areas with small habitat fragments may experience an increase in edge effects, where changes in population or community structures occur on the edges of habitats	Possible	Major	High	Consideration of fragmentation of habitat will be included in selection of planting sites, natural regeneration sites, targeted weed infestations and other land management activities. For the faunal habitat connectivity, fragmented patches should be identified and included as a consideration when selecting the planting sites. Connection of these patches will increase the extent of the current habitat and provide protection to the existing fragments through the reduction in edge effects.	Possible	Minor	Low
Adjacent land uses	Impacts may occur from adjacent land uses such	Unlikely	Minor	Low	Management of adjacent land uses such as large	Unlikely	Minor	Low

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
	as logging, railway lines and roads.				infrastructure projects has been considered when selecting offset sites. The location of plantings will be in areas that are not already selected for future development. Inspection and management of disturbances and land use impacts will be undertaken. Refer to Sections 4.5.6 and 5.5.6 for land use and management actions.			
Human trespass	Risk of humans traversing the site, particularly in areas where there are existing tracks, causing disturbance.	Possible	Minor	Low	If unauthorised access to the sites is recorded and considered to be having a negative impact, measures such as exclusion fencing and signage will be installed to prohibit public access to the offset sites. Refer to Sections 4.5.6 and 5.5.6 for land use and management actions.	Unlikely	Minor	Low
Flooding	A major flood event has the potential to severely disturb the offset site and cause individual or vegetation community mortality as well as	Possible	Major	High	Limit revegetation activities where terraced banks or gullies may be subject to flooding. Species selection and placement will consider flood	Unlikely	Major	High

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
	significantly affecting vegetation community integrity. A flood event has the potential to remove existing vegetation, potentially altering the species composition of an area and ultimately leading to a change in community composition and /or increasing the time to offset realisation.				impact on particular species during the planting stage. This may be in conjunction with a tree guard that will be removed when the plant has become established. Following a flood event, remedial action may be required at a scale appropriate to the size, extent and intensity of the disturbance. Refer to Sections 4.5.7 and 5.5.7 for guidance on flood management.			
Land degradation from significant rainfall event	Erosion of topsoil from overland sheet flow or gully erosion on steep slopes occurring during significant rainfall events after site clearing.	Likely	Moderate	Medium	Baseline surveys to identify areas of existing erosion or unstable soils. Access to sites for maintenance or monitoring may be limited during high rainfall events. Timing of activities in relation to wet weather should be considered when attempting access. Alternate access arrangements such as on foot rather than vehicle may be required.	Unlikely	Minor	Low

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
					Where areas are identified as sloping, land stability should be considered for planting suitability in the event of significant rainfall events. Low lying areas that will remain water logged may only be suitable for select species and should be positioned within the landscape based on their tolerance for soils that are not free draining. Refer to Sections 4.5.6 and 5.5.6 for land use and management actions.			
Bushfire	Fire has the potential to severely disturb offset sites and cause individual tree or vegetation community mortality as well as affect vegetation community integrity. Species composition of the offset may be altered which could lead to a change in the vegetation community composition.	Possible	Major	High	Baseline assessments will include the identification of existing internal and external firebreaks and locations where firebreaks require maintenance. Fire breaks may be implemented where a considerable risk to offset area is identified. New fire breaks will be located outside of offset areas, wherever possible.	High	Possible	Medium

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
	Fire also has the potential to increase the time to offset realisation.				Restriction of access to offset sites will assist in reducing fire ignition risks. If monitoring identifies an extreme risk of fire to the site that is not able to be mitigated in other ways, investigation into coordinated controlled burns hazardous fuel load reduction through the surrounding areas with local councils or state government may be considered. Refer to Sections 4.5.7 and 5.5.7 for guidance on flood management.			
Grazing	Stock on adjacent properties and herbivorous fauna entering the offset sites and grazing on vegetation.	Possible	Minor	Low	Maintain perimeter fences to exclude stock access. Use tree guards on planted stock to reducing grazing impacts if observed.	Unlikely	Minor	Low
Prolonged drought	Prolonged periods without rainfall have the potential to cause plant stress and/or death and increase the time to offset realisation.	Possible	Moderate	Medium	The use of watering during the early establishment as outlined in Sections 4.5.3 and 5.5.3 of this report will assist the survival of the plants.	Possible	Moderate	Medium

Risk name	Risk description	Initial Likelihood	Initial Consequence	Initial risk rating	Management measures	Residual Likelihood	Residual Consequence	Residual risk rating
					Planting will be undertaken at a suitable time of year when there is a greater chance of rain occurring within the first six months of establishment. Monitoring will be used to determine the impacts of prolonged drought. Additional watering events may need to be applied if there is a risk of the planted stock dying.			

7. References

Big Scrub Rainforest Landcare Group 2019. *Subtropical Rainforest Restoration*, Third Edition. Big Scrub Rainforest Landcare Group, Bangalow.

Chenoweth EPLA and Bushland Restoration Services 2012. *South East Queensland Ecological Restoration Framework: Manual*. Prepared on behalf of SEQ Catchments and South East Queensland Local Governments, Brisbane.

Commonwealth of Australia 2010. *Survey guidelines for Australia's threatened birds*, Accessed 12 November 2019, Available at: https://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds-april-2017.pdf.

Commonwealth of Australia 2014. *EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Accessed 6 November 2019, Available at: https://www.environment.gov.au/system/files/resources/dc2ae592-ff25-4e2c-ada3-843e4dea1dae/files/koala-referral-guidelines.pdf.

Cristescu, R. H., E. Foley, A. Markula, G. Jackson, D. Jones and C. Frère 2015. Accuracy and efficiency of detection dogs: a powerful new tool for koala conservation and management. *Scientific Reports 5*.

DECC 2008. *Recovery plan for the koala* (Phascolarctos cinereus). New South Wales Department of Environment and Climate Change (DECC), Sydney.

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

Ellis, William & FitzGibbon, Sean & Melzer, Alistair & Wilson, Robbie & Johnston, Stephen & Bercovitch, Fred & Dique, David & Carrick, Frank 2013. Koala habitat use and population density: Using field data to test the assumptions of ecological models. *Australian Mammalogy. 35*. 10.1071/AM12023.

Eyre TJ, Kelly AL and Neldner VJ 2017. *Method for the Establishment and Survey of Reference Sites for BioCondition*. Version 3. Queensland Herbarium, Department of Science, Information Technology and Innovation, Brisbane.

Eyre, T.J., Kelly, A.L., Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. 2015*. BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual*. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts, Brisbane.

Mathieson, M.T. and Smith, G.C. 2009. *National recovery plan for the black-breasted button-quail* Turnix melanogaster. Report to the Department of the Environment, Water, Heritage and the Arts, Canberra. Department of Environment and Resource Management, Brisbane.

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. 2019. *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland*. Version 5.0. Updated March 2019. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

Phillips, S. and Callaghan, J. 2011. The Spot Assessment Technique: a tool for determining localised levels of habitat use by koalas Phascolarctos cinereus. *Australian Zoologist 35*, 774–780.

Queensland Herbarium 2018. *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland*, Version 3.0, June 2018. Department of Environment and Science, Brisbane.

State of Queensland 2019. *Guide to voluntary declarations under the Vegetation Management Act 1999*. Department of Natural Resources, Mines and Energy, Brisbane.

Threatened Species Scientific Committee (TSSC) 2015. *Conservation Advice* Turnix melanogaster, Accessed 12 November 2019, Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/923-conservation-advice-31102015.pdf.

Woosnam-Merchez, O., Cristescu, R., Dique, D., Ellis, B., Beeton, R., Simmonds, J., and Carrick F. 2012. What faecal pellet surveys can and can't reveal about the ecology of koalas Phascolarctos cinereus. *Australian Zoologist*: 2012, Vol. 36, No. 2, pp. 192-200.

Appendix A – EPBC referral (2017/7941) relevant approval conditions

Item number	EPBC Referral 2017/7941 conditions of approval
Condition 9	To compensate for the loss of 135.83 hectares of **Koala habitat** and 8.08 hectares of **Black-breasted Button-quail habitat**, the approval holder must, prior to **commencement**, **legally secure** a minimum of 280.36 hectares at the **Koala offset areas** and 32.15 hectares at the **Black-breasted Button-quail offset area**. Within 20 **business days** of securing the **Koala offset areas** and **Black-breasted Button-quail offset area**, and prior to **commencement**, the approval holder must provide the **Department** with evidence of the date the **Koala offset areas** and **Black-breasted Button-quail offset area** were **legally secured** and electronic spatial data (eg. **Shapefile**) and **offset attributes** of the **Koala offset areas** and **Black-breasted Button-quail offset area**.
Condition 10	Within 6 months of **legally securing** the **Koala offset areas** and **Black-breasted Button-quail offset area**, the approval holder must complete baseline surveys of the entire **Koala offset areas** and **Black-breasted Button-quail offset area**. The baseline surveys must be conducted by a **suitably qualified person** in accordance with the most recently published version of the **Department's survey guidelines** and include details of: a. The quality of **Black-breasted Button-quail habitat** and **Koala habitat**; b. **Weed infestation**; c. **Koala density** and **Black-breasted Button-quail presence**; and d. **Pest abundance**.
Condition 11	Within 1 year of legally securing the **Koala offset areas** and **Black-breasted Button-quail offset area**, the approval holder must publish on the **website** and provide to the **Department** a report detailing: a. The results of the baseline surveys required under condition 10; b. Management measures, prepared by a **suitably qualified person** and subsequently reviewed by an independent **suitably qualified person**, (including timing, frequency and longevity) that will be implemented to deliver the outcomes required by condition 12, including: i. Performance and completion criteria for evaluating the success of the management measures and criteria for triggering remedial action (if necessary); ii. A program, including timelines, to monitor (capable of timely detection of triggers for corrective action) and report on the effectiveness of the management measures, and progress against the performance and completion criteria; iii. Remediation measures to be implemented where monitoring of the performance criteria indicate failure to achieve the outcomes of condition 12; and iv. A description of potential risks to the successful implementation of the management measures and a description of the control measures that

Item number	EPBC Referral 2017/7941 conditions of approval
	would be implemented to mitigate against these risks and residual risk ratings.
Condition 12	The approval holder must: a. For the duration of the approval, ensure no net loss in the **quality** and extent of **Black-breasted Button-quail habitat** and the **Koala habitat** within the **Koala offset areas** and **Black-breasted Button-quail offset area** compared to the baseline survey data reported under condition 11.a; b. Within 12 months of completing the baseline surveys required by condition 11a for the **Koala offset areas**, commence implementation of an ongoing **Koala food tree** replanting program in the **Koala offset areas**. The replanting program must be undertaken by a **suitably qualified person** and include measures to ensure the maintenance and survival of new **Koala food trees** in the **Koala offset areas**. c. Within 15 years of completing the baseline surveys required by condition 11a, demonstrate a 20% increase in **Koala food tree** recruitment over the entire **Koala offset areas** compared to the baseline survey results reported under condition 11.a; d. Demonstrate the following reductions in **weed infestation** in all of the **Koala offset areas** and the **Black-breasted Button-quail offset area** compared to the baseline data reported as required under condition 11.a: i. 50% reduction within 3 years of completing the baseline surveys required by condition 11a; ii. 90% reduction within 10 years of completing the baseline surveys required by condition 11a. e. Within 15 years of completing the baseline surveys required by condition 11a, demonstrate that an increase of at least 50% of **Koala density** has been achieved across the entire **Koala offset areas** compared to the baseline data reported under condition 11.a. To determine progress towards this outcome, **Koala density** surveys must be undertaken across the entirety of the **Koala offset areas** by a **suitably qualified person** within both 5 and 10 years respectively of completing the baseline surveys required by condition 11a. Contingency measures must be implemented to increase **Koala density** across the entire **Koala offset areas** where the results of these surveys indicate no or minimal increases in **Koala density**; f. Demonstrate a reduction across each of the **Koala offset areas** and the **Black-breasted Button-quail offset area**, maintained for 10 consecutive years from completion of the baseline surveys required by condition 11a, in **pest abundance** compared to the baseline data reported under condition 11.a; g. Report to the **Department** in each compliance report required under condition 20, matters required under condition 11b, and progress towards and achievement of the outcome milestones specified in this condition 12.

Appendix B – BioCondition Site Assessment Datasheet

BIOCONDITION SITE ASSESSMENT DATASHEET

Queensland Government

OFFICE USE ONLY
Entered:...................
Checked:.................
Corrected:...............

Site ID: ....

DATE: ..../......../........

BioCon survey number:.................

OBSERVERS:..

SITE INFORMATION

General habitat survey number:.................

LOCATION: (GPS reference) **Bioregion:** _ _ _ _ _ _ _ _ _ _ _ _ _

Datum: ☐ AGD84 ☐ GDA94 (WGS84) OTHER: _ _ _ _ _ **Location derivation:** _ _ _ _ _ _

Road: zone: _ _ _ **easting:** _ _ _ _ _ _ **northing:** _ _ _ _ _ _ _ _ **Plot Centre Direction:** _ _ _ _ **m at** _ _ _ _ **degrees**

Plot Origin: zone: _ _ _ **easting:** _ _ _ _ _ _ _ **northing:** _ _ _ _ _ _ _ _ **Accuracy:** _ _ _ _

Plot Centre zone: _ _ _ **easting:** _ _ _ _ _ _ _ **northing:** _ _ _ _ _ _ _ _ **Accuracy:** _ _ _ _

Plot bearing: _ _ _ **Plot alignment description:** _

Locality description (include tenure and reserve number): _

_ _

_ _

REGIONAL ECOSYSTEM AND TREE HEIGHTS:

Habitat Description _

_ _

_ _

Regional Ecosystem: _ _ _ _ _ **Tree Canopy (EDL*) height:** ...... **Tree subcanopy and/or emergent ht:** **S:** ...... **E:** ......

SITE PHOTOS:

(Photo Numbers)

Plot centre:

North		South		East		West	

Landscape photo(s): ______ **Spot photo(s):** ______

50 x 20m area:

(NB: All logs >10cm, >0.5m within 50 x 20m area measured to the plot boundary)

Coarse woody debris:

Length: ....

....

....

....

....

....

....

.... **Site Total:**

Per ha Total:

100 x 50m area:

Total native tree spp richness:

(NB: *Ecologically Dominant Layer. Tree defined as single stemmed over 2m. All tree species in the 100 x 50m (not just EDL species)

....

....

....

....

....

.... **Total:**

Proportion of dominant canopy (EDL) species with evidence of recruitment: ...... **%**

50 x 10m area: Native Plant Spp Richness:

(NB: List species if known or count if unknown. Shrub is defined as single stemmed below 2m or multi-stemmed from base or below 20cm)

	Total
Shrub spp. richness:	
Grass spp. richness:	
Forbs and others spp. richness:	

Non-native plant cover (%): .... **%**

....

BIOCONDITION SITE ASSESSMENT DATASHEET cont....

Five 1 x 1m plots: *attributes are essential to assess as used in scoring, however assessment of all attributes improves your ability to more accurately visualise proportions of each of the attributes.

Ground Cover:	1	2	3	4	5	Mean
Native perennial ('decreaser') grass cover*						
Native other grass (if relevant)*						
Native forbs and other species (non-grass)						
Native shrubs (<1m in height)						
Non-native grass						
Non-native forbs and shrubs						
Litter*						
Rock						
Bare ground						
Cryptograms						
Total	100%	100%	100%	100%	100%	

100 x 50m area: *from benchmark doc.

Eucalypt large tree DBH*: .....

Non-eucalypt large tree DBH*: .....

No. of large eucalypt trees (tally):

Total: .....

No. of large non-eucalypt trees (tally):

Total: .....

Total large trees (ha):

.....

100m transect:

Tree Canopy Cover: (Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them)

Tree or tree group* (C or S or E)	Distance (m)	Total	Tree or tree group* (C or S or E)	Distance (m)	Total	Tree or tree group* (C or S or E)	Distance (m)	Total	Tree or tree group* (C or S or E)	Distance (m)	Total
										Total C:	
										Total S:	
										Total E:	

Shrub Canopy Cover: * denote as native or exotic. Only native shrub cover is used in the scoring.

Shrubs*	Distance (m)	Total	Shrubs*	Distance (m)	Total	Shrubs*	Distance (m)	Total	Shrubs*	Distance (m)	Total	Shrubs*	Distance (m)	Total
													Total native:	
													Total exotic:	

Appendix C – Site Context Scores

Site Context Scores

Lot on Plan	AU	Total patch size (ha)	Patch score	Connectedness (%)	Connectedness score	Context (% RE)	Context score	Ecological corridor	Ecological corridor score	Total score	Score out of 10
102SP297908	TMR 25	622	10	86	5	29	2	Not within	0	17	6.5
102SP297908	TMR 26	622	10	65	4	35	4	Not within	0	18	6.9
102SP297908	TMR 27	622	10	92	5	30	4	Not within	0	19	7.3
102SP297908	TMR 39	622	10	29	2	33	4	Not within	0	16	6.2
1MPH23906	TMR 12	9979	10	60	4	55	4	Within	6	24	9.2
1MPH23906	TMR 40	9979	10	57	4	58	4	Within	6	24	9.2
1MPH23906	TMR 41	9979	10	56	4	58	4	Within	6	24	9.2
1MPH23906	TMR 42	9979	10	23	2	62	4	Within	6	22	8.5
1MPH23906	TMR 43	9979	10	13	2	71	4	Within	6	22	8.5
2SP302526	TMR 1	622	10	86	5	51	4	Not within	0	19	7.3
2SP302526	TMR 2	622	10	100	5	46	4	Not within	0	19	7.3
2SP302526	TMR 3	622	10	87	5	50	4	Not within	0	19	7.3
2SP302526	TMR 4	622	10	97	5	50	4	Not within	0	19	7.3
2SP302526	TMR 5	622	10	54	4	49	4	Not within	0	18	6.9
2SP302526	TMR 30	622	10	76	5	47	4	Not within	0	19	7.3
2SP302526	TMR 31	622	10	77	5	46	4	Not within	0	19	7.3
2SP302526	TMR 32	622	10	100	5	57	4	Not within	0	19	7.3
3MPH23906	TMR 11	9979	10	70	4	84	5	Within	6	25	9.6
3MPH23906	TMR 46	9979	10	81	5	85	5	Within	6	26	10.0
3MPH23906	TMR 47	9979	10	47	2	84	5	Within	6	23	8.8
3SP302524	TMR 6	622	10	55	4	50	4	Not within	0	18	6.9
3SP302524	TMR 33	622	10	100	5	53	4	Not within	0	19	7.3
3SP302524	TMR 34	622	10	46	2	53	4	Not within	0	16	6.2
3SP302524	TMR 35	2.2	0	0	0	53	4	Not within	0	4	1.5
3SP302524	TMR 36	624	10	66	4	51	4	Not within	0	18	6.9
3SP302524	TMR 37	622	10	18	2	45	4	Not within	0	16	6.2

Lot on Plan	AU	Total patch size (ha)	Patch score	Connectedness (%)	Connectedness score	Context (% RE)	Context score	Ecological corridor	Ecological corridor score	Total score	Score out of 10
3SP302524	TMR 38	622	10	57	4	47	4	Not within	0	18	6.9
4MPH23906	TMR 10	9979	10	100	5	61	4	Within	6	25	9.6
878MCH1061	TMR 8	9979	10	98	5	67	4	Within	6	25	9.6
878MCH1061	TMR 9	9979	10	69	4	56	4	Within	6	24	9.2
878MCH1061	TMR 13	9979	10	89	5	65	4	Within	6	25	9.6
878MCH1061	TMR 48	9979	10	64	4	48	4	Within	6	24	9.2
878MCH1061	TMR 49	9979	10	56	4	58	4	Within	6	24	9.2
878MCH1061	TMR 50	9979	10	48	2	52	4	Within	6	22	8.5
889CP864404	TMR 14	9979	10	52	4	52	4	Not within	0	18	6.9
889CP864404	TMR 51	9979	10	87	5	49	4	Not within	0	19	7.3
889CP864404	TMR 52	9979	10	98	5	58	4	Not within	0	19	7.3
889CP864404	TMR 53	9979	10	56	4	52	4	Not within	0	18	6.9
889CP864404	TMR 54	9979	10	23	2	49	4	Not within	0	16	6.2
889CP864404	TMR 55	9979	10	54	4	46	4	Not within	0	18	6.9
1MPH5670	GRC 1	93	5	100	5	40	4	Not within	0	14	5.4
1MPH5670	GRC 8	93	5	100	5	40	4	Not within	0	14	5.4
1MPH23904	GRC 2	93	5	82	5	37	4	Not within	0	14	5.4
1MPH23904	GRC 7	93	5	100	5	40	4	Not within	0	14	5.4
2MPH14193	GRC 3	93	5	93	5	34	4	Not within	0	14	5.4
2MPH14193	GRC 9	93	5	100	5	41	4	Not within	0	14	5.4
19RP226325	GRC 4	47	5	90	5	22	2	Not within	0	12	4.6
19RP226325	GRC 5	47	5	92	5	23	2	Not within	0	12	4.6
19RP226325	GRC 6	47	5	71	4	20	2	Not within	0	11	4.2
763MCH5342	GRC 10	93	5	93	5	34	4	Not within	0	15	5.8

Appendix D – Modified QLD Habitat Quality template

1. Fauna

OFFSET - Fauna Species

Assessment Unit - Regional Ecosystem	**Eg. AU 1 - RE 11.5.3 remnant**																												
Site Reference	**Benchmark**	Eg. Site 6						Average	Average	**Benchmark**							Average	Average	**Benchmark**							Average	Average	**Total average % benchmark**	**Total average score**
	11.5.3	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score	**11.5.9**	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score	**11.4.2**	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score		
Site Condition																													
Recruitment of woody perennial species in EDL																													
Native plant species richness - trees																													
Native plant species richness - shrubs																													
Native plant species richness - grasses																													
Native plant species richness - forbes																													
Tree canopy height (average of emergent, canopy, sub-canopy)																													
Tree canopy cover (average of emergent, canopy, sub-canopy)																													
Shrub canopy cover																													
Native grass cover																													
Organic litter																													
Large trees (euc plus non-euc)																													
Coarse woody debris																													
Non-native plant cover																													
Quality and availability of food and foraging habitat																													
Quality and availability of shelter																													
Site Condition Score																													
MAX Site Condition Score				*100*			*100*		*100*				*100*			*100*		*100*				*100*			*100*		*100*		*100*
Site Condition Score - out of 3									**0.00**									**0.00**									**0.00**		
Site Context																													
Size of patch																													
Connectedness																													
Context																													
Ecological Corridors																													
Role of site location to species overall population in the state																													
Threats to the species																													
Species mobility capacity																													
Site Context Score																													
MAX Site Context Score				*56*			*56*		*56*				*56*			*56*		*56*				*56*			*56*		*56*		*56*
Site Context Score - out of 3									**0.00**									**0.00**									**0.00**		

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10
		No	Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		15
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score	0	10	20		30
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table below*)	0	5		10	15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)						
SRR Score (out of 4)						

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	15
		No	Yes

Final habitat quality score (weighted)	**AU1**	**AU2**	**AU3**	**verage/Final**
Site Condition score (out of 3)				
Site Context Score (out of 3)				
Species Stocking Rate Score (out of 4)				
Habitat Quality score (out of 10)	*0*	*0*	*0*	*0.00*
Assessment Unit area (ha)				
Total offset area (ha) for this MNES				
Size Weighting				
Weighted Habitat Quality Score	***0.00***	***0.00***	***0.00***	***0.00***

Appendix E – Record of Site Works and Inspection/Maintenance Schedule

Date	Location	Contractor Name	Site works	Inspection / Maintenance Activity	Required Follow-up Action and Timing	Photo / Checklist Ref. No.