Environmental Impact Statement

Uungula Wind Farm

Appendix G: Framework for Biodiversity Assessment (Eco Logical Australia, 2020)

May 2020

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Uungula Wind Farm

BIODIVERSITY ASSESSMENT REPORT AND BIODIVERSITY OFFSET STRATEGY

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Template 2.8.1

Executive Summary

CWP Renewables Pty Ltd (CWPR) plans to develop the Uungula Wind Farm (UWF), herein referred to as the Project, within the Dubbo Regional Council Local Government Area, approximately 14 km east of Wellington, NSW. The Project generally consists of the installation, operation, maintenance and decommissioning of up to 97 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), Ancillary Infrastructure and Temporary Facilities. The Project is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 megawatts (MW) or greater.

Eco Logical Australia (ELA) was engaged by CWPR to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) to support the Environmental Impact Statement (EIS) for the Project. The BAR and BOS respond directly to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project, which require biodiversity to be assessed and biodiversity offsets to be calculated in accordance with the Framework for Biodiversity Assessment (FBA).

The BAR includes an assessment of the biodiversity values which may be affected by the Project, identified through a comprehensive data audit and literature review, Geographic Information Systems (GIS) analysis and series of ecological field surveys. The Study Area subject to assessment includes all infrastructure associated with the Project within a 100 m Development Corridor buffer surrounding the Development Footprint, Ancillary Infrastructure such as transmission lines and proposed public road upgrades extending outside of the Development Corridor.

The Study Area further extends to include mapped vegetation which has since been excluded from the Project design but is still deemed relevant for the assessment of biodiversity. The Development Footprint is located within the Development Corridor and comprises the extent of predicted ground disturbance required for the Project which forms the basis for assessment of impacts and offset calculations in the BAR, totalling approximately 659 ha. The Development Footprint will be subject to a detailed design process and will likely be reduced as the Project progresses.

The Project was assessed under the former BioBanking Assessment Methodology (BBAM) in 2013 by Environmental and Resource Management (ERM), on a Study Area roughly three times the size of the current Project Development Footprint. The ERM assessment included a significant field survey effort completed in 2012 – 2013 undertaken in accordance with Director General's Requirements (DGRs) issued for the Project in 2011 (superseded by the current SEARs), which has been considered in the preparation of this BAR. In particular, vegetation mapping and the data collected from vegetation plots under the BBAM has been used, which is consistent with the FBA plot data collection methodology. Consultation was undertaken with the (former) NSW Office of Environment and Heritage (OEH) in October 2018 regarding the use of the ERM data for this assessment. It was concluded that the ERM survey effort undertaken in 2012 – 2013 was adequate, the data remained relevant for the assessment and supplementary field survey was only required to address gaps due to changes in the Development Footprint.

The preparation of the BAR included searches of the relevant threatened species registers, review of available vegetation mapping and information for the area, and comprehensive review of the ERM assessment. The ERM assessment was supplemented by a series of further field surveys undertaken by

ELA in 2018, 2019 and 2020, primarily to validate previously mapped vegetation and to assess any gaps due to changes in the Project footprint. GIS analysis of the desktop review and field survey data was compiled to produce a single combined vegetation mapping layer. Vegetation was mapped to Biometric Vegetation Type (BVT) as required by the FBA.

Five BVTs were identified in the Study Area comprising a total of 639 ha to be affected by the Development Footprint, including both woodland and derived native grassland (DNG) vegetation, with the remaining 20 ha farm dams or cleared land/non-native vegetation. Vegetation was stratified into 13 vegetation zones based on vegetation condition.

Approximately 24.3 ha of the vegetation mapped within the Development Footprint is associated with one Threatened Ecological Community (TECs) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act):

- White Box Yellow Box Blakely's Red Gum Woodland (listed as an Endangered Ecological Community [EEC] under the BC Act).

Approximately 11.25 ha of the BC Act listed TEC is considered the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed TEC:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as a Critically Endangered Ecological Community [CEEC] under the EPBC Act).

The area of TEC is based on the current vegetation mapping and will be refined for the detailed design. The assessment of impacts to the EEC/CEEC has been undertaken on an assumption that the area may increase by up to 25%, to 30 ha, under the detailed design.

Vegetation zones were entered into the BioBanking Credit Calculator for Major Projects (BBCC) supported by plot and transect data from the ERM assessment. Due to changes in the Development Footprint since the plots were completed, plot data was entered from plots adjacent to, but not directly within, the Development Footprint. The number of credits required to offset impacts to each BVT was calculated.

The BBCC output included generation of predicted threatened species which may be affected by the Project. The list of candidate species was reviewed in conjunction with the results of the data review, including habitat assessment and species records from the field surveys. A likelihood of occurrence assessment was undertaken to determine those candidate species known, likely or with the potential to be affected by the Project.

No threatened flora species have been recorded within the Study Area from or since the ERM surveys which were undertaken in accordance with the 2011 DGRs. Five (5) threatened flora candidate species were identified as having the potential to occur in the Development Footprint based on the associated BVTs, presence of suitable habitat and nearby previous records:

- *Acacia ausfeldii* (Ausfeld's wattle)
- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)

- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata.*

Whilst none of the above flora species have been recorded in the Study Area, The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat prior to vegetation clearing and micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

There are a number of threatened fauna species records in and around the Study Area, including those identified through the field survey effort. However, the majority of threatened fauna known, likely or with the potential to occur are ecosystem credit species. One threatened fauna species credit candidate species was recorded by ERM in the Study Area, although not within the current Development Footprint, during targeted surveys:

- *Petaurus norfolcensis* (Squirrel glider)

Four (4) further threatened fauna candidate species were considered to have the potential to occur within the study area, based on the presence of suitable habitat:

- *Petrogale penicillata* (Brush-tailed Rock-wallaby)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Phascolarctos cinereus* (Koala)
- *Anthochaera phrygia* (Regent honeyeater).

Of the potentially occurring species, only Koala is known from nearby records and is considered likely to occur, albeit in low numbers, in the Development Footprint.

Species polygons were created for Koala and Squirrel glider based on their associated BVTs within the Development Footprint. Species credits have been calculated on the area (ha) of the species polygons for these two species.

Species credits have not been calculated for the remaining three candidate fauna species. Whilst there is potential for these species to occur in the Development Footprint, none of these species have been previously identified in the Study Area and nearby records are scattered. The Proponent propose to undertake further assessment in suitable habitat or obtain expert reports for these species once the detailed design process is complete and the Development Footprint is finalised.

The Development Footprint has been subject to considerable revision and reduction since it was first conceptualised and is currently approximately one third the size of the original Project design. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint. Avoidance of EEC/CEEC and threatened species habitat through design consideration will continue through to construction, including detailed ecological survey prior to construction and micro-siting of infrastructure to avoid impacts to any previously unrecorded threatened species. Ongoing management measures will be implemented to manage unavoidable impacts at all stages of the Project and will be detailed in a comprehensive Biodiversity Management Plan to be developed for the Project post-approval.

Threatened species and communities protected under the EPBC Act which may be affected by the Project have been identified in this report, and justification is provided where impacts are considered unlikely. Affected species and communities will be offset through either ecosystem or species credit species under the FBA. Further assessment of EPBC Act protected species and communities is included in this BAR and in the EIS for the Project.

The results of the BAR, including the vegetation and threatened species assessment results, were entered into the BBCC for the current Development Footprint, which is indicative only and subject to a detailed design process. A total of 26,988 ecosystems credits would be required, however, it is expected that the offset requirement will be recalculated once the final Development Footprint is determined. The assessment of impacts to the EEC/CEEC has been undertaken on an assumption that the area may increase by up to 25%, to 30 ha (14 ha of the CEEC), under the detailed design; however, this has not been included in the credit calculation as it is unable be assigned to a particular vegetation zone.

Species credits for koala and squirrel glider were calculated at 3,632 and 3,073 species credits respectively.

Following the refinement of the final development footprint, CWPR will recalculate the credits required to offset the impacts and implement a BOS for the Project. The BOS would use one, or a combination, of the following:

- acquiring or retiring credits by:
    - purchasing existing credits
    - creating new credits by establishing a land-based offset area
- making payments into an offset fund.

It is noted that credits calculated by the BBCC following assessment under the FBA will require determination of reasonable equivalent credits as determined by the current Biodiversity Offset Scheme under the BC Act, determined by the Biodiversity Assessment Method (BAM).

CWPR has commenced consultation with surrounding landowners to investigate the option of purchasing a neighbouring property as a land-based offset. Preliminary assessments have been undertaken on three properties which has included desktop review of publicly available vegetation community mapping and entry into the BAM Calculator (BAMC). The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with box gum woodland EEC/CEEC. Further investigation is required to refine and validate vegetation mapping to determine the offset potential, however, the presence and area (ha) of equivalent vegetation communities indicates that land-based offsets will provide a viable mechanism to secure and retire the required biodiversity offset credits.

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Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology
BBAMP	Bird and Bat Adaptive Management Plan
BBCC	BioBanking Credit Calculator for Major Projects
BC Act	NSW *Biodiversity Conservation Act 2016*
BCT	Biodiversity Conservation Trust
BCD	Biodiversity and Conservation Division of the NSW Department of Planning, Industry and Environment
BMP	Biodiversity Management Plan
BOS	Biodiversity Offset Strategy
BVT	Biometric Vegetation Type
CEEC	Critically Endangered Ecological Community
CWPR	CWP Renewables Pty Ltd
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DECC	(former) NSW Department of Environment and Climate Change
DGRs	Director General's Requirements
DNG	Derived Native Grassland
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EES	Environment, Energy and Science division of the NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
ELA	Eco Logical Australia
EP&A Act	NSW *Environmental Protection and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Pty Ltd
ERP	Emergency Response Plan
ESF	Energy Storage Facility
FBA	Framework for Biodiversity Assessment
GIS	Geographic Information Systems
IBRA	Interim Biogeographic Regionalisation of Australia

Abbreviation	Description
MW	Megawatt
OEH	NSW Office of Environment and Heritage (former)
SEARs	Secretary's Environmental Assessment Requirements
SPRAT	Species Profile and Threats (EPBC Act)
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act 1995* (now repealed)
UWF	Uungula Wind Farm
WTG	Wind Turbine Generators

1. Introduction

CWP Renewables Pty Ltd (The Proponent) plans to develop the Uungula Wind Farm (UWF), herein referred to as the Project, within the Dubbo Regional Council Local Government Area, approximately 14 km east of Wellington, NSW (Figure 1.1). The Project generally consists of the installation, operation, maintenance and decommissioning of up to 97 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), Ancillary Infrastructure and Temporary Facilities. The Project is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 megawatts (MW) or greater. The full Project Description is detailed in the Environmental Impact Statement (EIS) for the Project.

Eco Logical Australia (ELA) was engaged by CWPR to prepare this Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) as part of the EIS to support the application for Development Consent under the *Environmental Planning and Assessment Act 1979* (EP&A Act). This BAR and BOS have been developed in accordance with the NSW Framework for Biodiversity Assessment (FBA) in response to the Secretary's Environmental Assessment Requirements (SEARs) which were issued for the Project on 11 November 2019, detailed below in Table 1.1. The BAR includes a comprehensive assessment of native vegetation, threatened species and vegetation communities which may be affected by the Project, and calculation of the offset requirements. The BOS presents an overview of the strategy available to CWPR to appropriately retire biodiversity offsets for the Project.

Table 1.1: Project SEARs address in this report

SEARs	Response
Biodiversity – including:	
Assess biodiversity values and the likely biodiversity impacts of the development in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014) and Framework for Biodiversity Assessment (OEH, 2014), unless otherwise agreed by the Biodiversity and Conservation Division (BCD) (terrestrial biodiversity) or DPI Fisheries (aquatic biodiversity)	This BAR has been prepared under the FBA and includes a detailed assessment of the vegetation to be affected by the Project, as well as any impacts to threatened species, populations or endangered ecological communities.

It is noted that bird and bat strike associated with wind farm developments are not required to be assessed consistent with Section 2.3 of the FBA.

This BAR and BOS have been prepared and offset requirement calculated by ELA Ecologist Lily Gorrell, Accredited Assessor in accordance with Section 2.2.1 of the FBA.

1.1 Background

The Project was assessed under the former BioBanking Assessment Methodology (BBAM) (DECC 2009) in 2013 by Environmental Resources Management Pty Ltd (ERM), on a Study Area roughly three times the size of the current Development Footprint. The ERM assessment included a significant field survey effort, which although completed in 2012 – 2013, has been considered in this BAR. In particular, vegetation mapping and the data collected from vegetation plots under the BBAM has been used, which

is consistent with the FBA plot data collection methodology. Consultation was undertaken with the (former) NSW Office of Environment and Heritage (OEH) in October 2018 regarding the use of the ERM data for this assessment. It was concluded that the ERM survey effort from 2102 – 2103 was adequate and the data remained relevant for the assessment. Supplementary field survey was only required to address gaps due to changes in the Development Footprint.

Notwithstanding the ERM assessment, there are threatened species and ecological communities which will require further assessment to determine the impacts from the Project once the detailed design process is complete. This may include further threatened fauna surveys to confirm presence or absence, detailed pre-clearing surveys and micro-siting of infrastructure to avoid threatened species and habitat.

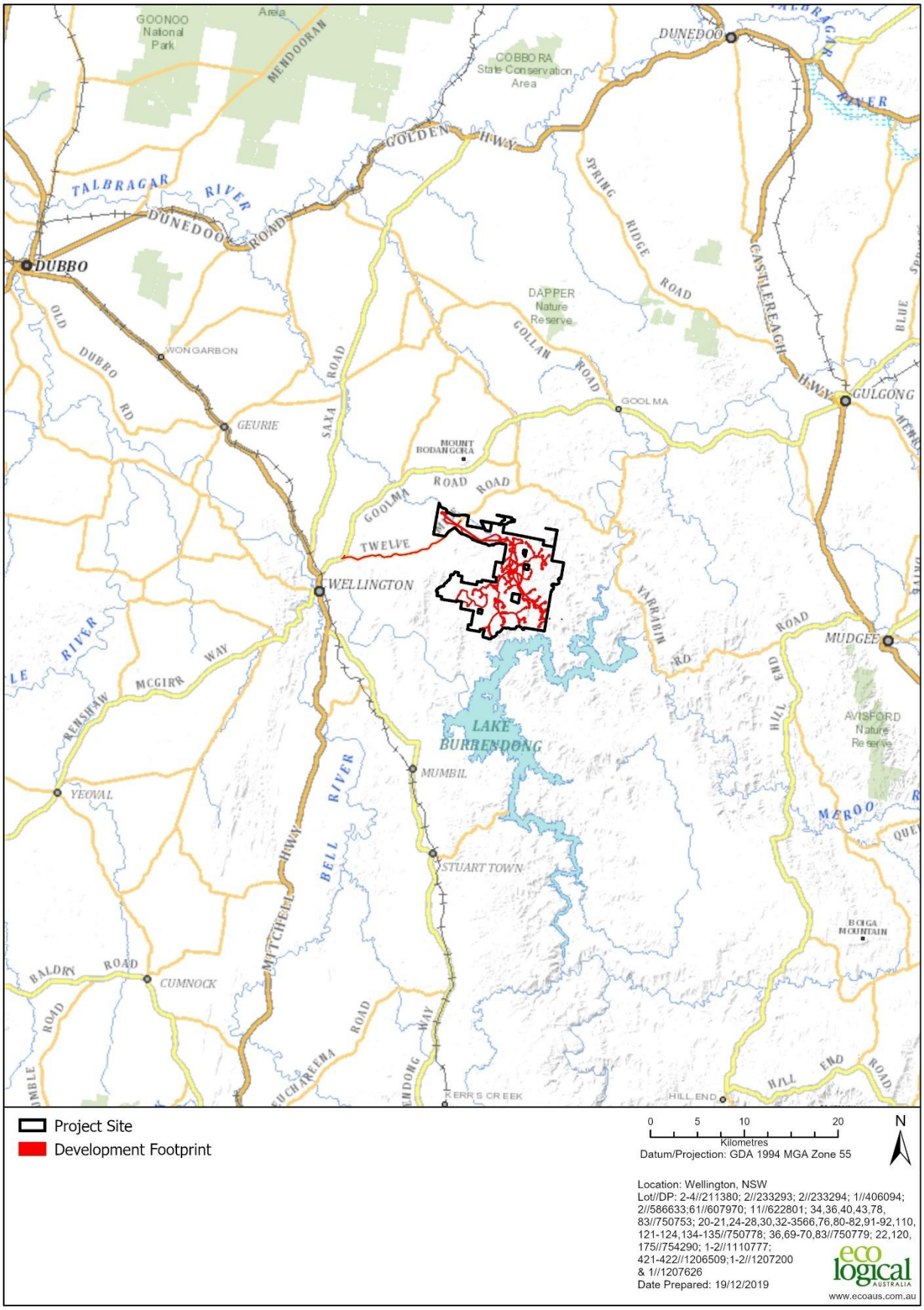

Figure 1.1: Project location

1.2 Study Area

The Study Area subject to this assessment includes all infrastructure associated with the Project within a 100 m Development Corridor buffer surrounding the Development Footprint, Ancillary Infrastructure such as transmission lines and proposed public road upgrades extending outside of the Development Corridor.

The Study Area further extends to include the extent of native vegetation mapped for the ERM assessment, within which threatened species surveys were undertaken. Roughly two thirds of the area assessed by ERM has since been removed from the Project design, however, is still deemed relevant for the assessment of biodiversity, in particular, vegetation mapping and data.

The Study Area, including the Development Footprint, Development Corridor and extent of vegetation mapped for the ERM assessment, is shown below in Figure 1.2.

1.3 Development Footprint and Development Corridor

The Development Footprint described in this assessment is indicative only and subject to a detailed design process. The indicative layout has been prepared based on the best knowledge available at the time. Flexibility is sought in the Development Consent to allow The Proponent to determine the optimal project layout within the limits of the impact assessment and Development Consent, generally in accordance with the EIS, post-Development Consent.

The Development Footprint subject to this assessment is the extent of ground disturbance including earthworks associated with Permanent Infrastructure and temporary facilities (other than temporary field laydown areas) in the Development Corridor, as well as ground disturbance required to upgrade external access roads extending beyond the Project Site. The Development Footprint is summarised below – detailed descriptions of each component is included in the Project EIS.

Permanent infrastructure includes all infrastructure that will remain on the Project Site during the operational phase of the Project, including:

- WTGs
- ESF
- Ancillary infrastructure including but not limited to:
    - substations
    - permanent offices and site compounds
    - underground and overhead electricity transmission lines
    - permanent meteorological masts
    - communication cables
    - water storage tank
    - hardstands
    - internal roads.

The Development Corridor extends 100 m either side of the current indicative Development Footprint to support flexibility in the design and final placement (micro siting) of the above components.

In addition, road widening upgrades will be required to two public roads to enable transport of WTG components to the Project Site. Twelve Mile Road, which accesses the western side of the Project Site from Wellington, and a small section of Ilgingery Road connecting the Development Footprint, will be subject to road widening upgrades. Impacts to biodiversity from the required upgrades along both sections of road are included in the Development Footprint for this assessment.

Temporary facilities include all facilities used for the construction, repowering and/or decommissioning of the Project, including but not limited to:

- temporary site offices and compounds
- rock crushing facilities
- concrete or asphalt batching plants
- stockpiles and materials storage compounds
- minor 'work front' construction access roads
- temporary meteorological masts.

The design includes in the Development footprint suitable buffers around all components to ensure the assessment has been made on a worst-case scenario to allow the Project to be constructed, operated, maintained and decommissioned within the limits of a typical wind farm Development Consent.

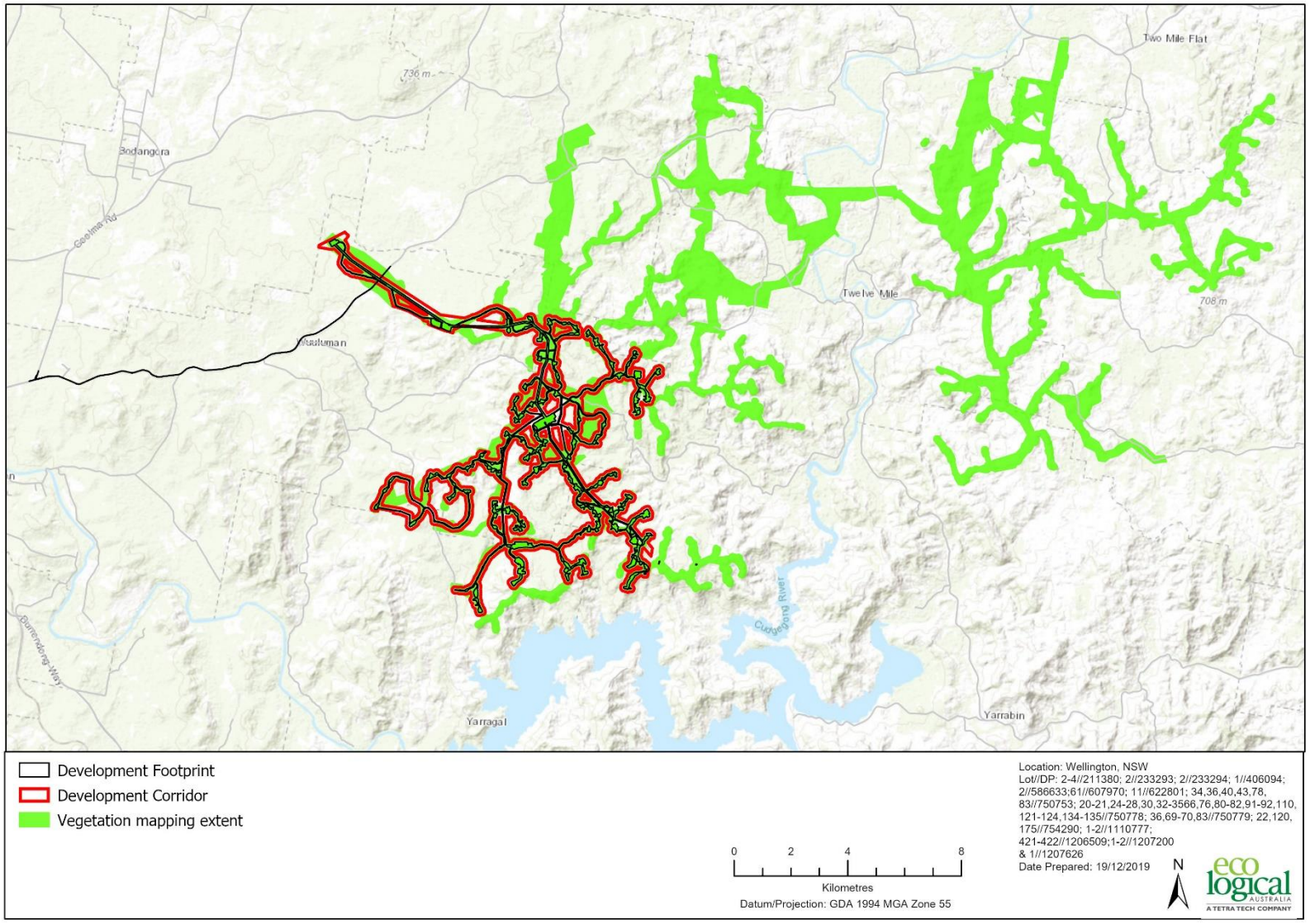

Figure 1.2: Study Area

1.4 General description of site

1.4.1 Landscape

The topography of the Study Area is generally gently undulating to undulating with numerous valleys and peaks. Elevations vary from 359 to 705 m AHD (Australian Height Datum); averaging 543 m AHD. Burrendong State recreation area surrounds Lake Burrendong with elevated ridges to the south of the Study Area. The character of the landscape has shifted considerably over time due to European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated.

1.4.2 Hydrology

The Study Area is within the Macquarie River catchment area which spans over 74,000 km^2, originating near Bathurst in Central Western NSW and travelling generally north-west through the towns of Wellington, Dubbo, Narromine and Warren.

Burrendong Dam, approximately 8km south of the southern boundary of the Development Footprint, which provides planned environmental water and stock and domestic flows. The NSW Government also manages licensed water for the environment.

The Cudgegong River, a main tributary of the Macquarie River, runs east of the Study Area with several smaller tributaries running through the landscape comprising 1st, 2nd, 3rd and 4th order Strahler streams and ephemeral creeks, including Uungula Creek, Bourke's Creek, Mitchell Creek, Ben Buckley Creek, Oxley's Creek, Bulls Gully and Ilgingery Creek. Flows from the Cudgegong River confluence with the Macquarie River at Burrendong Dam. The Macquarie River drains to the Macquarie Marshes and the Barwon-Darling River, which joins the Murray River in Southern NSW before flowing into the Southern Ocean.

1.4.3 Vegetation

The Study Area was once dominated by open forest and woodland, which has now been extensively cleared for agricultural use. Pockets of remnant native vegetation remain in open forests and woodlands comprising *Eucalyptus macrorhyncha* (Red Stringybark) and *E. dealbata* (Tumbledown Red Gum) on upper slopes with *Callitris endlicheri* (Black Cypress Pine), *Brachychiton populneus* (Kurrajong), *E. sideroxylon* (Mugga Ironbark), *E. albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum) on lower slopes. A comprehensive assessment of native vegetation is included in **Section 3**.

1.4.4 Land use

All land within and surrounding the Study Area is zoned RU1 Primary Production. Under existing land management, the Study Area is used predominantly for sheep grazing, with some cattle grazing. The land has been historically cleared and used for livestock grazing and some broadacre cropping, with isolated areas of intact remnant vegetation remaining in the landscape. Pastures have been improved with the introduction of exotic species with many other areas covered with native grass pastures. Whilst cropping operations are located within the landscape, due to the undulating topography and steep elevations in some sections, broad-acre cropping is not suitable across the majority of the Study Area. Surrounding land use includes extensive agriculture, residential dwellings associated with agricultural properties, State Conservation Areas and Lake Burrendong to the south.

1.5 Information sources

The following databases and literature were reviewed as part of this assessment:

- NSW BioNet Atlas (Department of Planning, Industry and Environment [DPIE] 2020a)
- Threatened Biodiversity Profile Data Collection (DPIE 2020b)
- NSW BioNet Vegetation Classification Database (DPIE 2020c)
- Archived BioMetric and Threatened Species Profiles datasets (DPIE 2020d)
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (Department of Agriculture, Water and the Environment [DAWE] 2020a)
- Species Profile and Threats (SPRAT) Database (DAWE 2020b)
- Uungula Wind Farm: Ecological Assessment (ERM 2013); prepared for Wind Prospect CWP Pty Ltd.

2. Landscape features

The assessment of landscape features for the Development Footprint was conducted in accordance with Appendix 4 of the FBA as a site based assessment using a 1 : 10 inner and outer assessment circle ratio (Table 2.1). A site-based assessment was chosen as the most suitable assessment method given the overall connected shape of the Development Footprint. The maximum outer assessment circle area allowable under the FBA is 15,000 ha. The Development Footprint is contained within the 15,000 ha outer assessment circle, however, the external transmission lines (with easement) and public road upgrade of Twelve Mile Road also form part of the Development Footprint and extend out of the 15,000 ha.

Table 2.1: Inner and Outer Assessment Circle 1 : 10 ratio

Inner Assessment Circle (ha)	Outer Assessment Circle (ha)
1,500	15,000

The landscape features are described below for the inner and outer assessment circles and are shown in a Location Map (Figure 2.1) and Site Map (Figure 2.2) as required by the FBA.

2.1 Interim Biogeographic Regionalisation of Australia

2.1.1 Bioregions

The Development Footprint occurs wholly within the NSW South Western Slopes Bioregion (Table 2.2).

Table 2.2: IBRA Bioregions occurring within the Development Footprint

IBRA Bioregion Name	Development Footprint
NSW South Western Slopes	100%

Note: IBRA = Interim Biogeographic Regionalisation of Australia

2.1.2 Subregions

The Development Footprint occurs wholly within the Inland Slopes Subregion (Table 2.3).

Table 2.3: IBRA Subregions occurring within the Development Footprint and

IBRA Subregion Name	Development Footprint
Inland Slopes	100%

2.2 Mitchell landscapes

The Mitchell landscapes within the Development Footprint are detailed below in Table 2.4.

Table 2.4: Mitchell Landscapes occurring within the Development Footprint

Mitchell Landscape	Cleared within CMA
Ophir – Hargraves Plateau	84%

Mitchell Landscape	Cleared within CMA
Bodangora Granite	98%

2.3 Streams and rivers

The Development Footprint is intersected by two 4th order streams, Mitchell and Ilgingerry Creeks, as categorised under the Strahler stream ordering system. A riparian buffer of 40 m (20 m either side) is applied as required by Appendix 2 of the FBA.

2.4 Wetlands

There are no wetlands within the Development Footprint.

2.5 Native vegetation extent

Within the Development Footprint, native vegetation was mapped using Google Satellite aerial imagery (streamed) at a minimum scale of 1 : 5, 000 and a maximum scale of 1 : 10, 000. Native vegetation mapping also considered knowledge of the locality, including potential canopy species, history of disturbance and previous site inspections (associated with previous assessments).

2.6 Landscape value score

2.6.1 Extent of current and future native vegetation cover

The extent of current and future native vegetation percent cover within the assessment circles was calculated in accordance with Appendix 4 of the FBA. The assessment was completed using Geographic Information Systems (GIS) using Google Satellite aerial imagery (streamed) in increments of 5%. The Project would result in the loss of approximately 139 ha of native vegetation percent cover from the inner assessment circle and 595 ha native vegetation percent cover from the outer assessment circle. The current and future extent native vegetation percent cover is shown below in **Table 2.5.**

Table 2.5: Current and future extent of native vegetation

	Before Development				After Development				Native veg score
	Native veg (ha)	% Native veg cover	% category	Score	Native veg (ha)	% Native veg cover	% category change	Score	
Inner (1,500ha)	1158	77.2%	76-80	9	1019	67.9%	66-70	8.5	0.5
Outer (15,000ha)	8474	56.5%	56-60	12.6	7879	52.5%	51-55	11.95	0.65
							Total native vegetation percent cover score		1.15

2.6.2 Patch Size

Patch size was calculated using the vegetation mapping prepared for this assessment (**Section 4**) as well and Google Satellite aerial imagery (streamed). The patch size included all vegetation patches linked to vegetation within the Development Footprint. Patches within the Development Footprint were considered linked when the adjacent vegetation was:

- in moderate to good condition
- has a patch size of > 1 ha
- is separated by a distance of < 100 m (or <30 m for non-woody ecosystems)
- is not separated by a large water body, dual carriageway, wider highway, or similar hostile link.

Based on the above criteria, patch size was considered to be extra large (1001 ha). The percentage of native vegetation cleared within the Ophir – Hargraves Plateau Mitchell Landscape is 84%. Based on this information, the patch size score has been calculated to be 12.

2.6.3 Landscape Value Score

Based on the assessment of landscape attributes above, the Landscape Value Score was calculated to be 22.2.

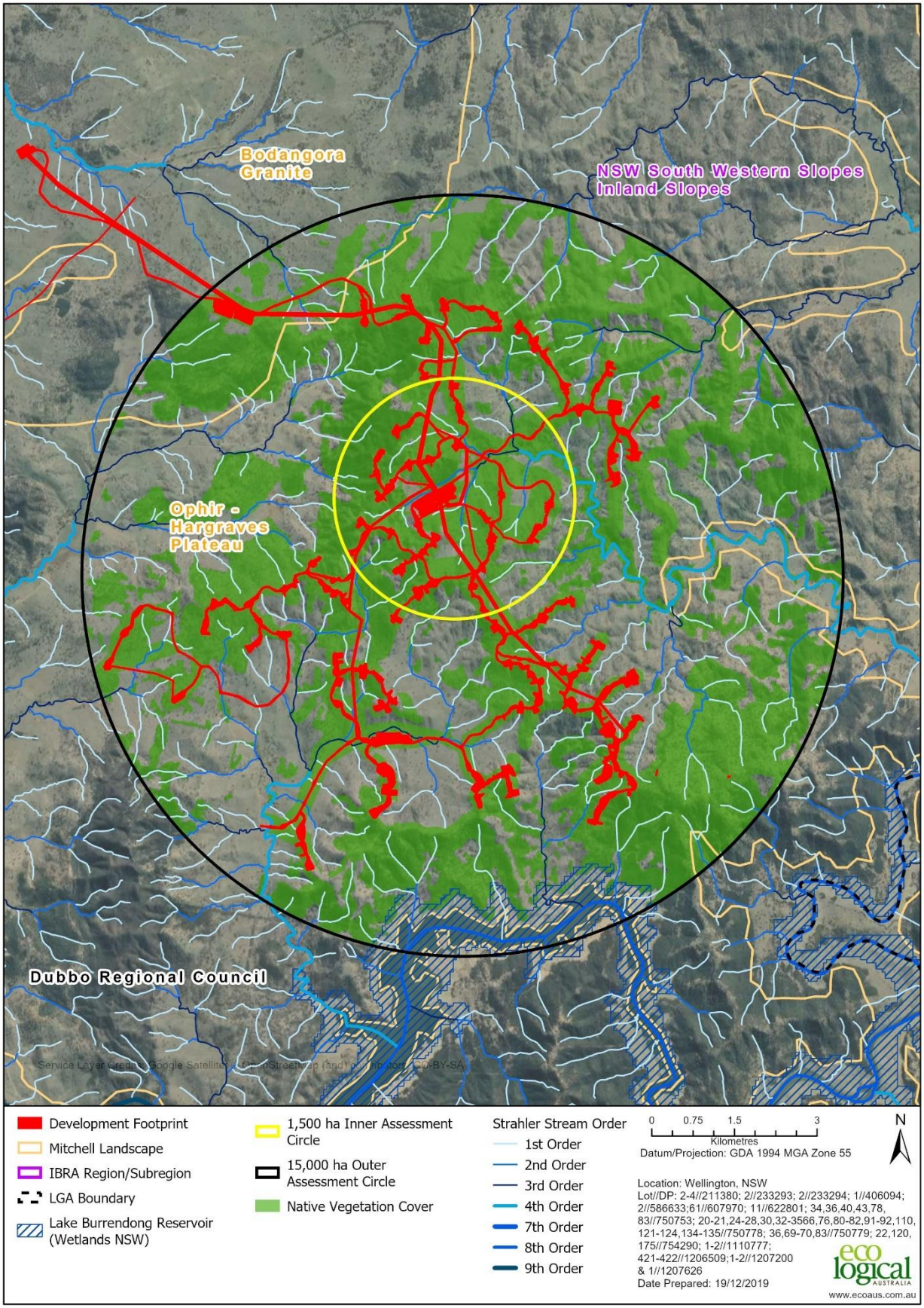

Figure 2.1: Location map

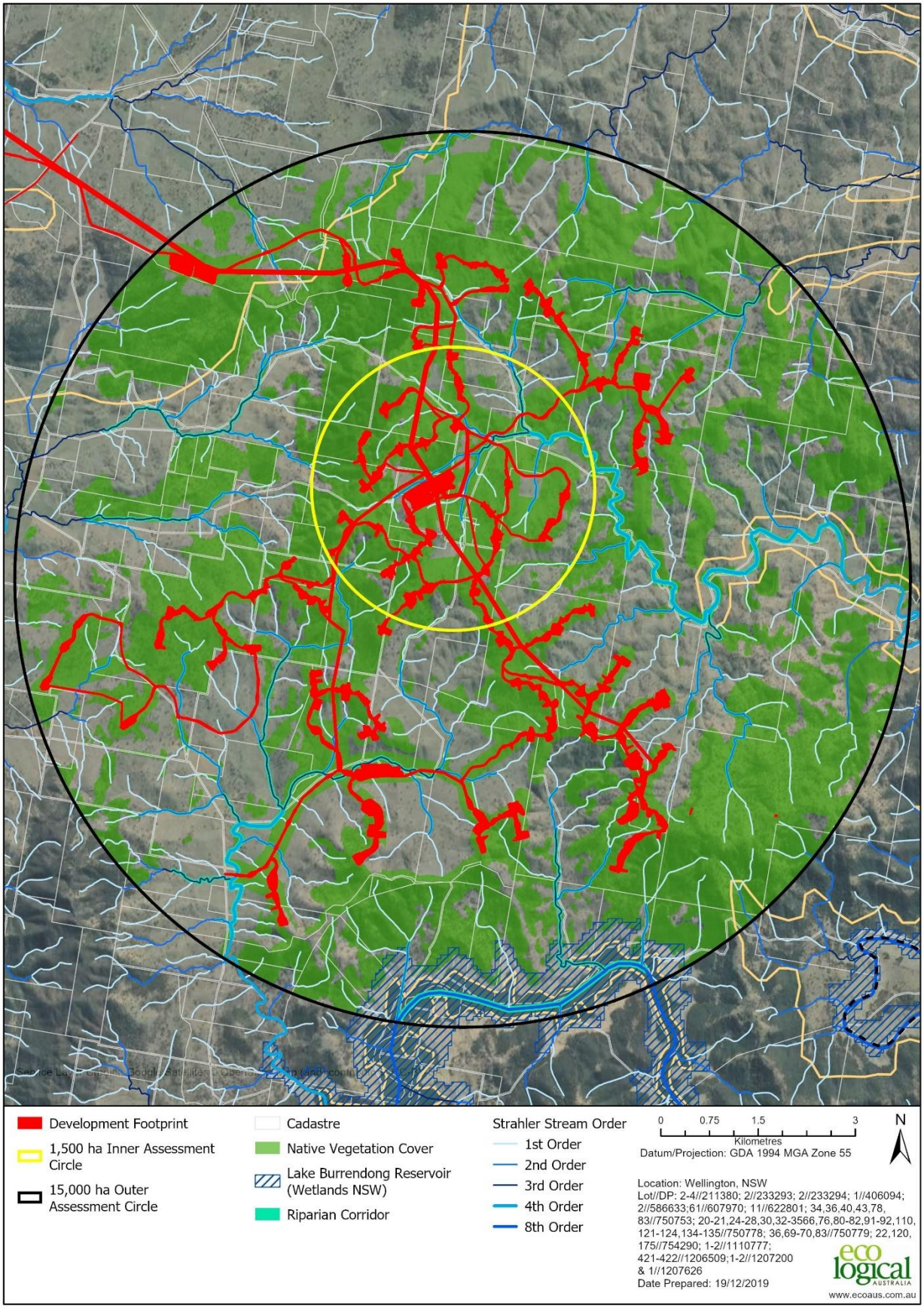

Figure 2.2: Site map

3. Native vegetation

3.1 Vegetation mapping

Vegetation surveys were undertaken by ERM in 2012 and 2013 across the Study Area, roughly three times the size of the current Development Footprint. Vegetation was mapped to Biometric Vegetation Type (BVT) and stratified according to condition class to identify vegetation zones.

Approximately 1,880 ha of native vegetation was mapped within a 1,927 ha Study Area. Due to the size of the Study Area, the scale of vegetation mapping undertaken by ERM is coarse and may require further refinement on the final Development Footprint. This would be achieved through pre-clearing ecological surveys and would be used to inform the final design and micro-siting of infrastructure.

High level validation of the ERM vegetation mapping was undertaken over a series of field surveys in select portions of the Study Area in September and October 2018 by ELA ecologists, led by Senior Botanist David Allworth and Senior Ecologist Dr Cheryl O'Dwyer. Detailed survey and vegetation mapping for the length of the proposed upgrade to Twelve Mile Road and Ilgingery Road was undertaken by ELA in July 2019, led by ecologists Lily Gorrell and Tomas Kelly. Further field vegetation validation was undertaken by ELA in January 2020 to address select gaps in the vegetation mapping from the revised Development Footprint, led by ecologist Tomas Kelly.

ELA vegetation assessment methodology included rapid assessments to determine vegetation type, extent and condition. Rapid assessments were undertaken against the listing criteria for Threatened Ecological Communities (TECs) under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. Rapid assessments involved describing the vegetation structure, topographic position, soils and any other relevant abiotic factors.

Quantitative analysis of the BVTs was undertaken by ERM in the 2012 assessment. Review of archived BioMetric datasets (DPIE 2020d) was undertaken by ELA for this assessment to incorporate the ELA field vegetation validation and refine the ERM vegetation mapping. No plots/transects were completed by ELA – all plot data used in this BAR is from the 2013 ERM assessment.

A combined vegetation mapping GIS layer was compiled for the Development Footprint. Five BVTs were identified comprising a total of 639 ha of native vegetation to be affected by the Development Footprint, including both woodland and derived native grassland (DNG) vegetation. Vegetation was stratified into 13 vegetation zones based on vegetation condition. Vegetation zones and BVT descriptions are detailed below in Table 3.1 and Figure 3.1. A map book containing detailed mapping of the vegetation to be affected by the proposed upgrade to Twelve Mile Road, is included in **Appendix A**. A further 20 ha within the Development Footprint could not be assigned to a BVT and contains cleared and exotic dominated vegetation, and farm dams.

Table 3.1: Vegetation zones within the Development Footprint

Vegetation Zone	BVT	Description	Condition	Conservation Status		Approx. Area (ha)	Plots required[1]	Plots completed[2]
				BC Act	EPBC Act			
1	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good _Moderate	White Box Yellow Box Blakely's Red Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	3.57	2	2
2	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good _Poor	-	-	64.72	5	5
3	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Medium	-	-	18.69	3	3
4	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Poor	-	-	26	4	4
5	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Other	-	-	7.21	3	3
6	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good _ Moderate	-	-	16.66	3	3
7	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good _Poor	-	-	11.27	3	3
8	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good _ Moderate	White Box Yellow Box Blakely's Red Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	7.68	3	3
9	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good _Poor	-	-	48.55	4	4

Vegetation Zone	BVT	Description	Condition	Conservation Status		Approx. Area (ha)	Plots required[1]	Plots completed[2]
				BC Act	EPBC Act			
10	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_ Moderate	White Box Yellow Box Blakely's Red Gum Woodland	-	13.05	3	3
11	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Poor	-	-	310.35	7	7
12	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Other	-	-	72.83	5	8
13	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Low	-	-	38.31	4	4
					Total	**639**	**49**	**52**

[1] Per Table 3 FBA

[2] ERM 2013

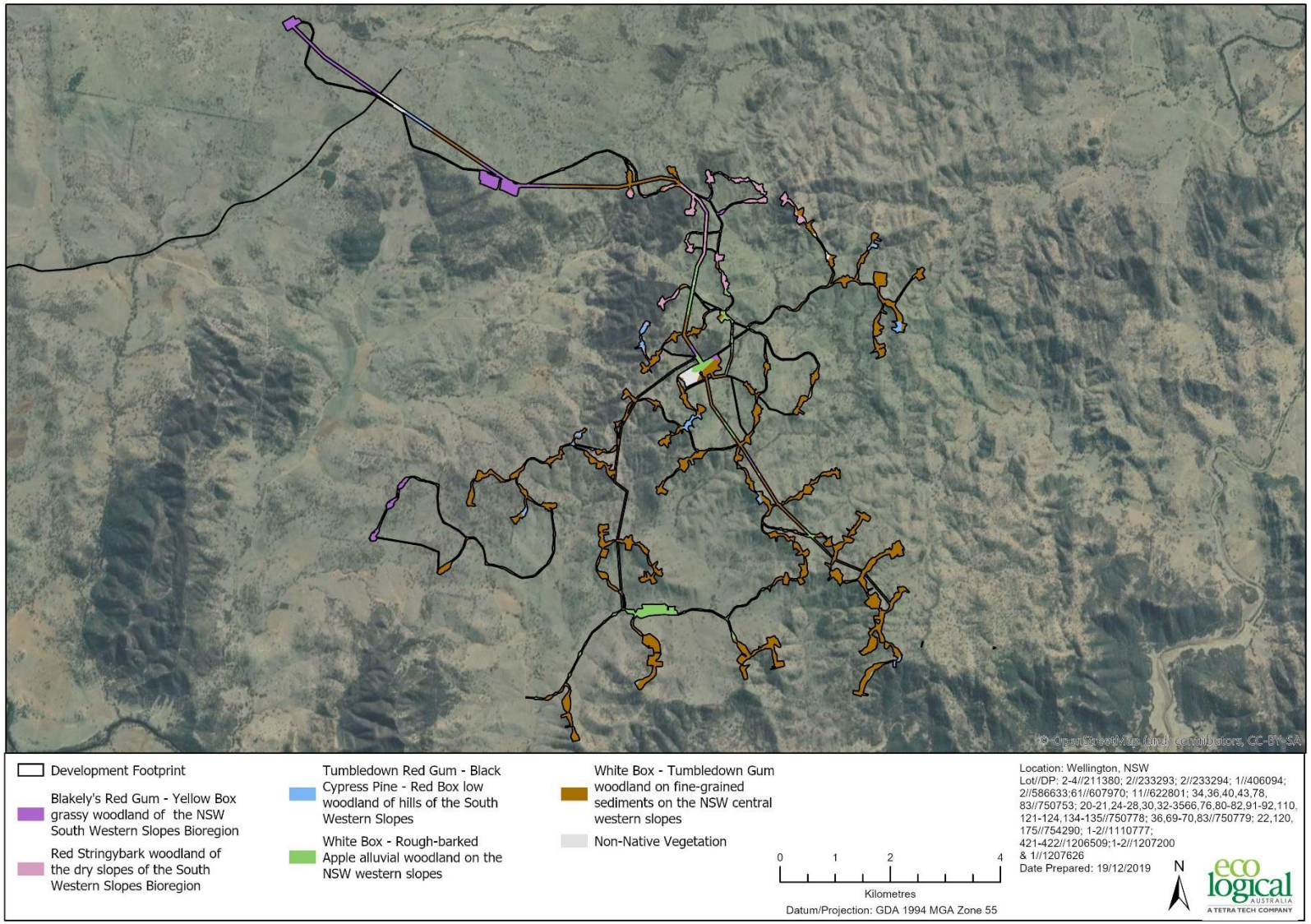

Figure 3.1: Development Footprint mapped vegetation type

3.1.1 Threatened Ecological Communities

Mapped TECs are listed against relevant BVTs above in Table 3.1 and are shown below in Figure 3.2. Approximately 24.3 ha of the vegetation has been mapped as TEC listed under the BC Act:

- White Box Yellow Box Blakely's Red Gum Woodland - listed as an Endangered Ecological Community (EEC).

Approximately 11.25 ha of this TEC has been mapped as the EPBC Act listed community:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland - listed as a Critically Endangered Ecological Community (CEEC).

Vegetation zone 10, mapped as BVT CW212 Moderate/Good_Moderate, was mapped by ERM as conforming to the NSW (now BC Act) TEC, but not to the EPBC Act TEC due to its presence on ridges and hilltops with skeletal soils, not highly fertile soils as specified by the listing criteria (Threatened Species Scientific Committee 2006).

Further assessment and refinement of EEC/CEEC mapping will be undertaken for the detailed design. The assessment of impacts to the TEC has been undertaken on an assumption that the area may increase by up to 25%, to 30 ha (14 ha of the CEEC), under the detailed design; however, this has not been included in the credit calculation as it is unable be assigned to a particular vegetation zone.

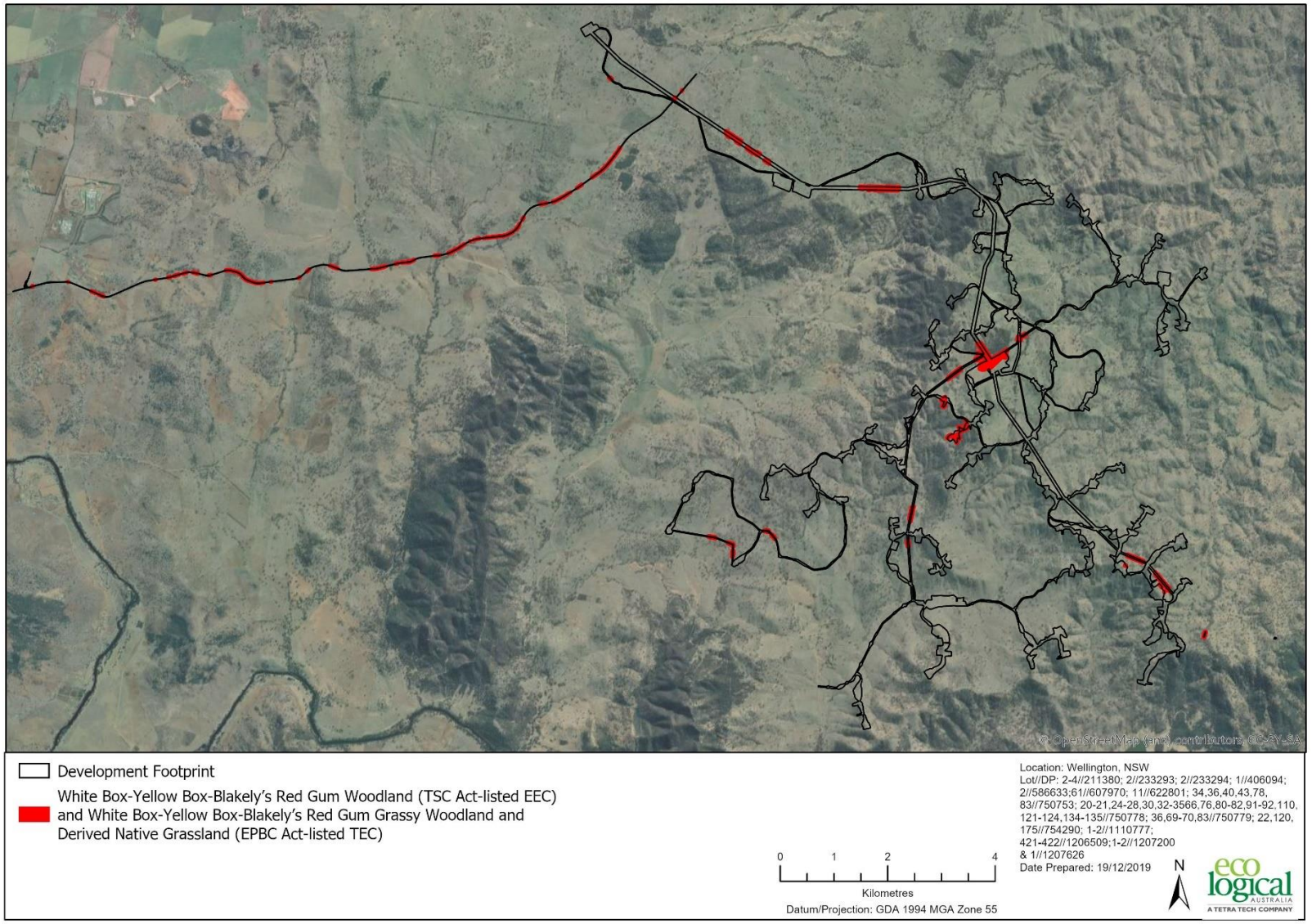

Figure 3.2: Development Footprint mapped Threatened Ecological Communities

3.2 Plot and transect surveys

A total of 105 plot and transects were completed by ERM in the Study Area according to the required number by area in each vegetation zone prescribed by the BBAM. Data collected from BBAM plots is consistent with the plot/transect data required for entry into the BioBanking Credit Calculator for Major Projects (BBCC) for the FBA, therefore the ERM collected data has been used for this BAR. In accordance with the number of plots required per vegetation zone prescribed in Table 3 of the FBA, a total of 49 plots were used in this assessment. No plots/transects have been completed by ELA.

Plot locations within the current Development Footprint are shown in Figure 3.3. Locations of the plots in the required vegetation zones, within the Study Area but outside the current Development Footprint, are shown in Figure 3.4. Plot data is included in **Appendix B**.

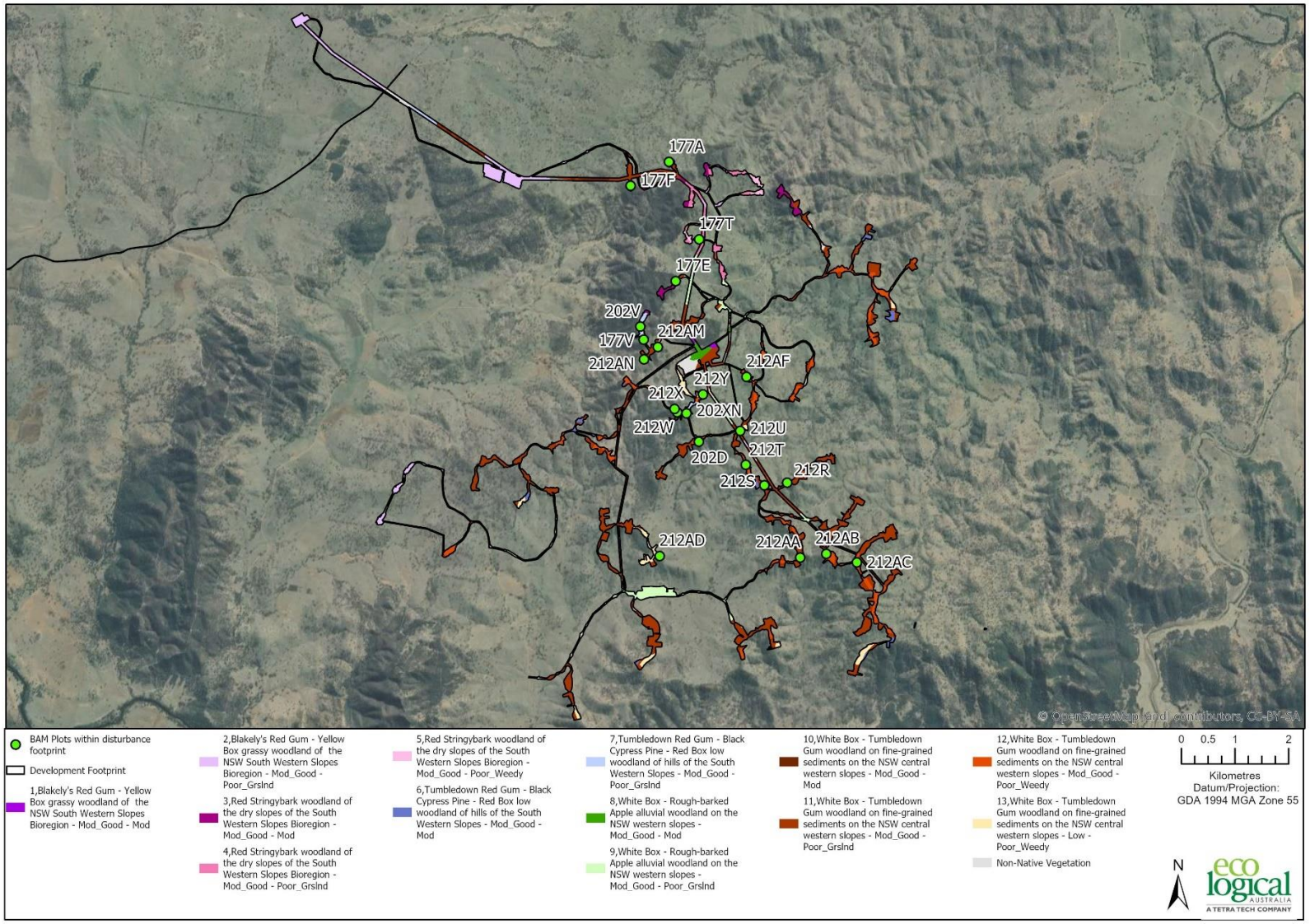

Figure 3.3: Plot locations within the Development Footprint

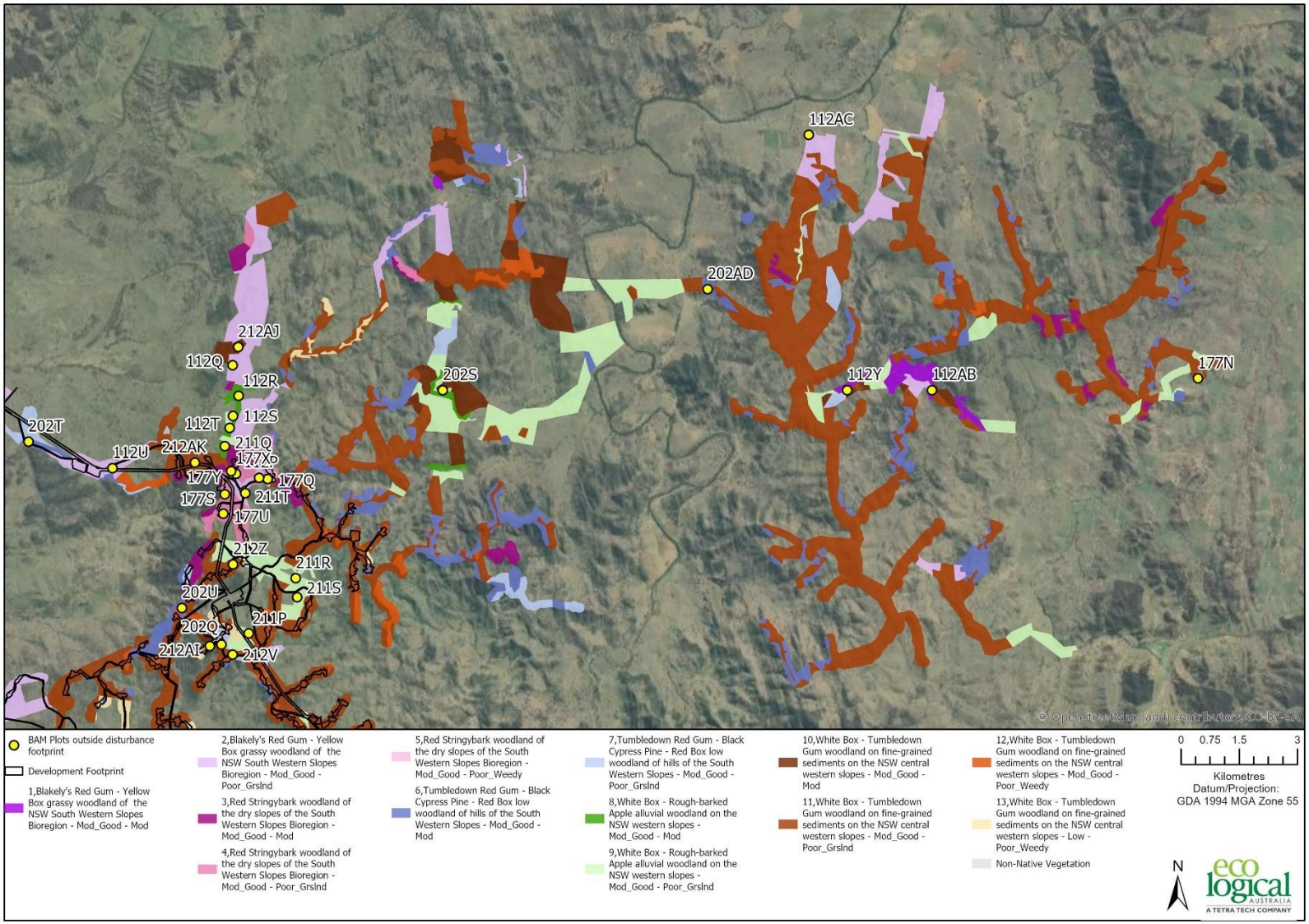

Figure 3.4: Plot locations for plots used outside of the Development Footprint

4. Threatened species

4.1.1 Threatened species survey effort

The ERM assessment included targeted surveys for threatened species in 2012 and 2013 in the greater Study Area in accordance with the methodology prescribed by the Director General's Requirements (DGRs) issued in 2011 (superseded by the current Project SEARs) . The survey methodology and effort are listed below.

4.1.1.1 Habitat assessment

The ERM assessment identified areas of potential threatened species habitat within the Study Area. The Study Area was found to be dominated by scattered trees and a mix of exotic and native pasture. Scattered trees were typically remnant trees containing hollows – a total of 110 hollow-bearing trees were recorded in the Study Area, with hollow sizes averaging 10 cm in diameter. Fragmented pockets of woodland vegetation were identified, with the largest stands occurring on the ridges and slopes. Riparian habitat is limited to small ephemeral creek lines and has mostly been cleared.

Habitat features include an abundance of fallen timber, exposed rock and rocky outcrops through much of the Study Area. There were no caves found to be present, however a number of very old disused mine adits were identified – these have been excluded from the Development Footprint and will not be affected by the Project.

4.1.1.2 Threatened species survey methodology

All surveys were undertaken between October and March unless specified otherwise:

- Threatened flora survey:
  - Random meander, total of 76.1 km of meander transects undertaken for 67 meander transects.
- Bird surveys:
  - Bird Utilisation Surveys: Two observers recording abundance of bird species for 15 minutes at 28 fixed survey points, over 16 days.
  - Woodland bird surveys: Total of 24 surveys employing 20 minutes of active searching a 2 ha area, including nest searches.
  - Call playback and spotlighting over nine nights.
- Microbats:
  - Songmeter recordings at 26 locations between November and February, undisclosed frequency.
  - Potential roost site surveys – active daytime searches of disused mine adits within the Study Area, followed by 30 minutes of active watching at dusk over two evenings.
  - Harp trap at potential roost sites over two nights.
- Mammals:
  - Static camera traps at 25 sites, 21 within woodland or forested areas, four within pasture with scattered trees. Deployed for 70 hours each, 73 full days of data

collection. Camera traps were baited with dead chicken to attract *Dasyurus maculatus* (Spotted-tailed Quoll).
    - Spotlighting at seven locations over nine nights, 35 person hours.
- Koala survey:
    - Spotlighting surveys conducted over 9 nights (35 person hours).
    - Koala scat searches conducted around 82 trees in three separate areas. Radius of one metre around base of tree searched by two ecologists until scat found or two minutes was reached.

4.1.1.3 Threatened species survey results

A number of threatened fauna species were recorded by ERM from the surveys; however, most were ecosystem credit species for the FBA, detailed further in **Section 4.2** below. Only one candidate species credit species was recorded in the Study Area, although not within the current Development Footprint:

- *Petaurus norfolcensis* (Squirrel Glider).

Species credit species are detailed further in **Section 4.3** below.

No threatened flora species were recorded during the surveys.

The locations of the ERM threatened species survey effort in relation to the current Development Footprint are shown in Figure 4.1.

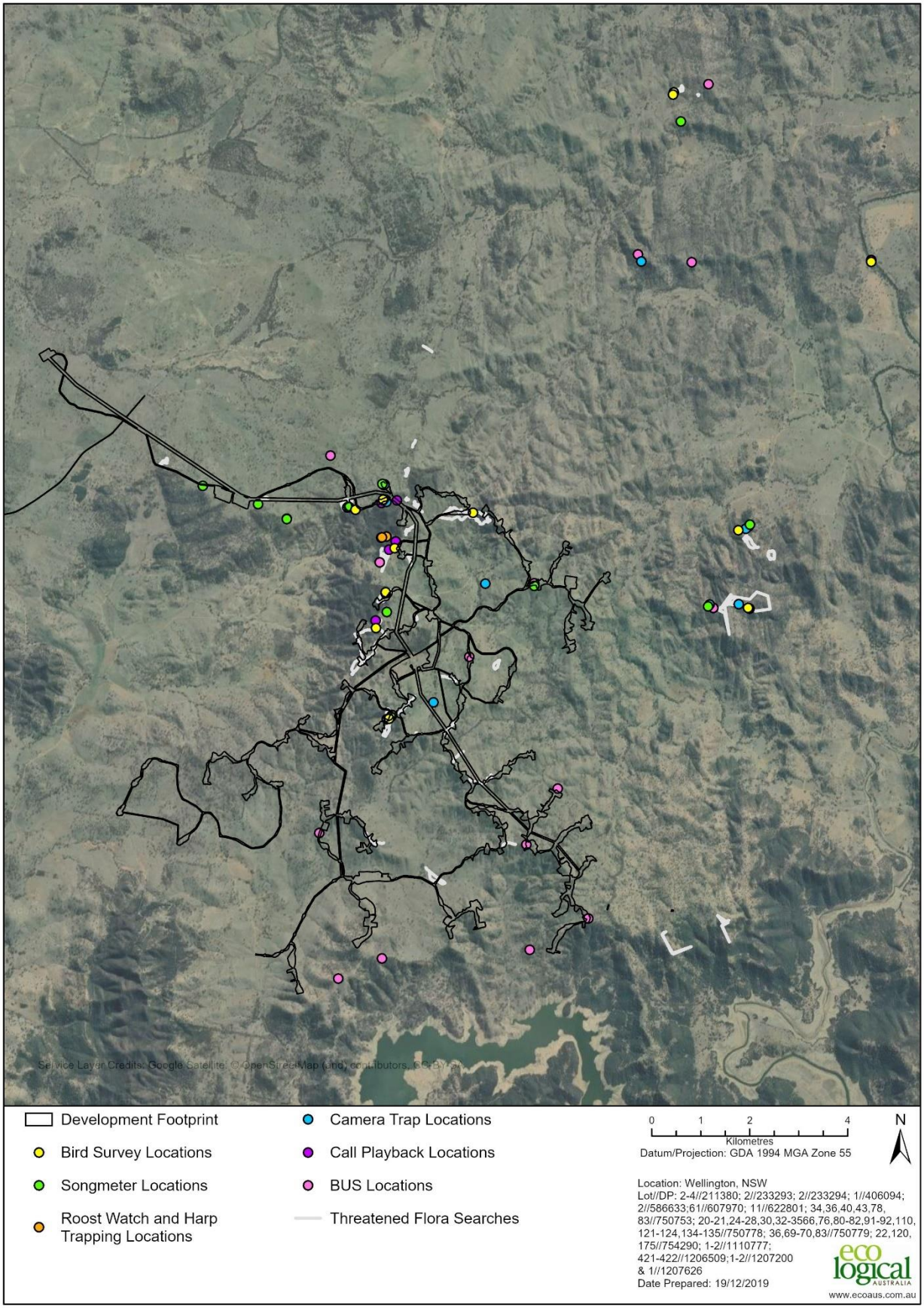

Figure 4.1: ERM Targeted Threatened Species Survey Effort

4.2 Ecosystem species

The vegetation zones identified in **Section 3** were entered into the BBCC to generate a list of predicted ecosystem species. A complete list of all predicted ecosystem species is shown in Table 4.1 below. No further assessment of these species was undertaken as any potential impacts would be accounted for through ecosystem credit offsets.

Table 4.1: Ecosystem credit species for the Development Footprint

Common Name	Scientific Name
Australian Painted Snipe	*Rostratula australis*
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis* subsp. *gularis*
Brolga	*Grus rubicunda*
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *victoriae*
Bush Stone-curlew	*Burhinus grallarius*
Corben's Long-eared Bat	*Nyctophilus corbeni*
Diamond Firetail	*Stagonopleura guttata*
Flame Robin	*Petroica phoenicea*
Freckled Duck	*Stictonetta naevosa*
Gang-gang Cockatoo	*Callocephalon fimbriatum*
Gilbert's Whistler	*Pachycephala inornata*
Glossy Black-Cockatoo	*Calyptorhynchus lathami*
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*
Hooded Robin (south-eastern form)	*Melanodryas cucullata* subsp. *cucullata*
Little Eagle	*Hieraaetus morphnoides*
Little Lorikeet	*Glossopsitta pusilla*
Little Pied Bat	*Chalinolobus picatus*
Little Whip Snake	*Suta flagellum*
Magpie Goose	*Anseranas semipalmata*
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*
Masked Owl	*Tyto novaehollandiae*
New Holland Mouse	*Pseudomys novaehollandiae*
Painted Honeyeater	*Grantiella picta*
Powerful Owl	*Ninox strenua*
Scarlet Robin	*Petroica boodang*
Speckled Warbler	*Chthonicola sagittata*
Spotted Harrier	*Circus assimilis*
Spotted-tailed Quoll	*Dasyurus maculatus*
Square-tailed Kite	*Lophoictinia isura*
Swift Parrot	*Lathamus discolor*

Common Name	Scientific Name
Turquoise Parrot	*Neophema pulchella*
Varied Sittella	*Daphoenositta chrysoptera*
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*

Two further threatened species have been identified within the Study Area but are not included in the list above:

- *Pteropus poliocephalus* (Grey-headed Flying-fox) – identified from a single carcass caught in barbed-wire fencing (ERM 2012)
- *Polytelis swainsonii* (Superb Parrot) – identified on the site by ERM in the 2012 – 2013 surveys, and again opportunistically by ELA when undertaken vegetation mapping surveys of Twelve Mile Road in 2019.

Both of these species are ecosystem credit species for BVTs identified in the Development Footprint and no further assessment is required.

4.3 Species credit species

Species credit species are threatened flora and fauna species that cannot be predicted by vegetation type. Candidate species credit species with the potential to occur within the Development Footprint, based on the presence of suitable habitat, must be surveyed to determine presence or absence.

The list of candidate species credit species for the Development Footprint was generated by the BBCC and is listed in Table 4.2 below. Candidate species credit species have been reviewed in consideration of the ERM assessment, updated NSW BioNet Atlas records and EPBC Protected Matters Search Tool results.

Table 4.2: Species credit species for the Development Footprint

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Assessment Required?
Ausfeld's Wattle	*Acacia ausfeldii*	Y	Total of 76.1km of meander transects undertaken for 67 meander transects.	Potential – 12 records within 20km of the Study Area (BioNet 2020a)	Yes – pre-clearing survey and avoidance required during micro-siting of infrastructure
Booroolong Frog	*Litoria booroolongensis*	N – no permanent watercourses to be affected by the Project	None undertaken.	Unlikely	No
Brush-tailed Phascogale	*Phascogale tapoatafa*	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Unlikely – no records within 20km radius of the Study Area, not identified in survey	No
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Potential – habitat present, nearest record 15km from Study Area	Yes
Capertee Stringybark	*Eucalyptus cannonii*	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Clandulla Geebung	*Persoonia marginata*	Y	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – no records within 20km radius of the Study Area, not identified in survey	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Eastern Pygmy-possum	*Cercartetus nanus*	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within	Potential, although no records within 20km of the site	Yes

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Assessment Required?
			pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).		
Eucalyptus alligatrix subsp. alligatrix	*Eucalyptus alligatrix* subsp. *alligatrix*	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Euphrasia arguta	*Euphrasia arguta*	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Grevillea divaricata	*Grevillea divaricata*	N	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Koala	*Phascolarctos cinereus*	Y	Spotlighting surveys conducted over nine nights (35 person hours). Koala scat searches conducted around 82 trees in three separate areas. Radius of one metre around base of tree searched by two ecologists until scat found or two minutes was reached.	Likely to occur in the Study Area, albeit in low numbers. Nearest record 7.6 km from the Study Area.	Yes – species credits calculated
Large-eared Pied Bat	*Chalinolobus dwyeri*	Foraging. No potential breeding habitat to be affected.	85 songmeter nights across study area. Two nights each of two mine adit entrance watching, songmeter placement and harp trapping.	Likely – potential calls from this species identified from songmeter recordings.	No. This species is only a species credit species for breeding habitat. This species is covered under the ecosystem credits for foraging habitat.

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Assessment Required?
Narrow Goodenia	*Goodenia macbarronii*	N	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely	No – this species is no longer listed as threatened under the BC Act or EPBC Act.
Pink-tailed Legless Lizard	*Aprasia parapulchella*	Y	Four days of reptile surveys. Surveys included turning of logs, rocks and other ground debris.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Regent Honeyeater	*Anthochaera phrygia*	Y	24 woodland bird surveys, 20-minute searches of 2 ha areas during spring and summer.	Potential	Yes
Scant Pomaderris	*Pomaderris queenslandica*	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure
Silky Swainson-pea	*Swainsona sericea*	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – records nearby	Yes – pre-clearing survey and avoidance required during micro-siting of infrastructure
Small Purple-pea	*Swainsona recta*	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – records nearby	Yes – pre-clearing survey and avoidance required during micro-siting of infrastructure
Squirrel Glider	*Petaurus norfolcensis*	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Known – recorded in the Study Area by ERM, albeit not within the current Development Footprint.	Yes – species credits calculated

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Assessment Required?
Zieria obcordata	*Zieria obcordata*	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – records nearby	Yes – pre-clearing survey and avoidance required during micro-siting of infrastructure

Two further potential species credit species were identified for the Development Footprint from the database searches, detailed below in Table 4.3.

Table 4.3: Additional potential species credit species

Common name	Scientific name	Habitat potential	Likelihood of occurrence	Further Assessment Required?
Bluegrass	*Dichanthium setosum*	Y	Potential – records nearby	Yes – pre-clearing survey and avoidance required during micro-siting of infrastructure
Sand-hill Spider Orchid	*Caladenia arenaria*	N - requires sandy soils dominated by *Callitris glaucophylla* (White Cypress Pine)	Unlikely	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure

Threatened flora and fauna records for the Development Footprint and 10 km buffer, including ERM recorded species, are shown in Figure 4.2 and Figure 4.3 respectively.

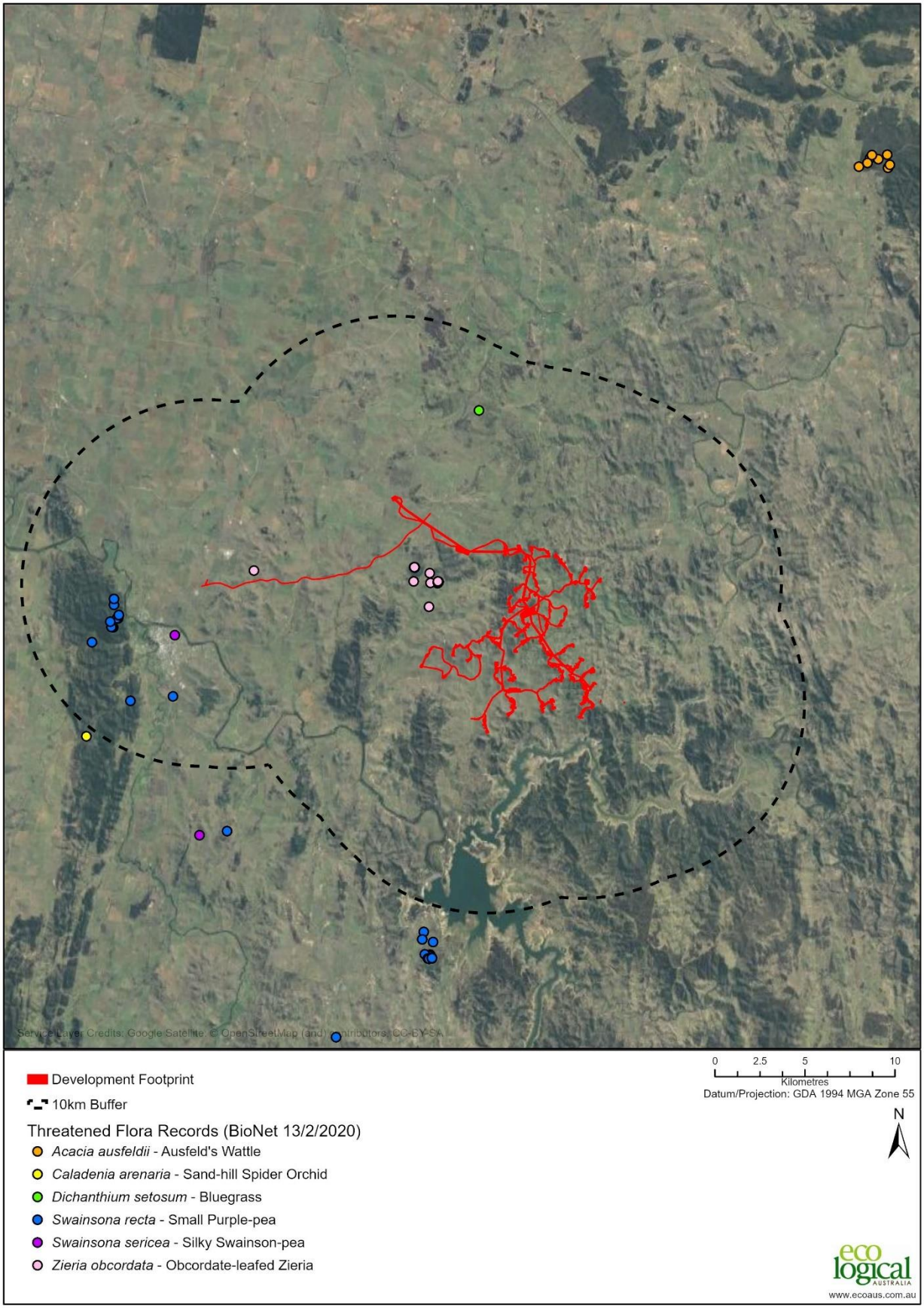

Figure 4.2: Threatened flora records for the Development Footprint

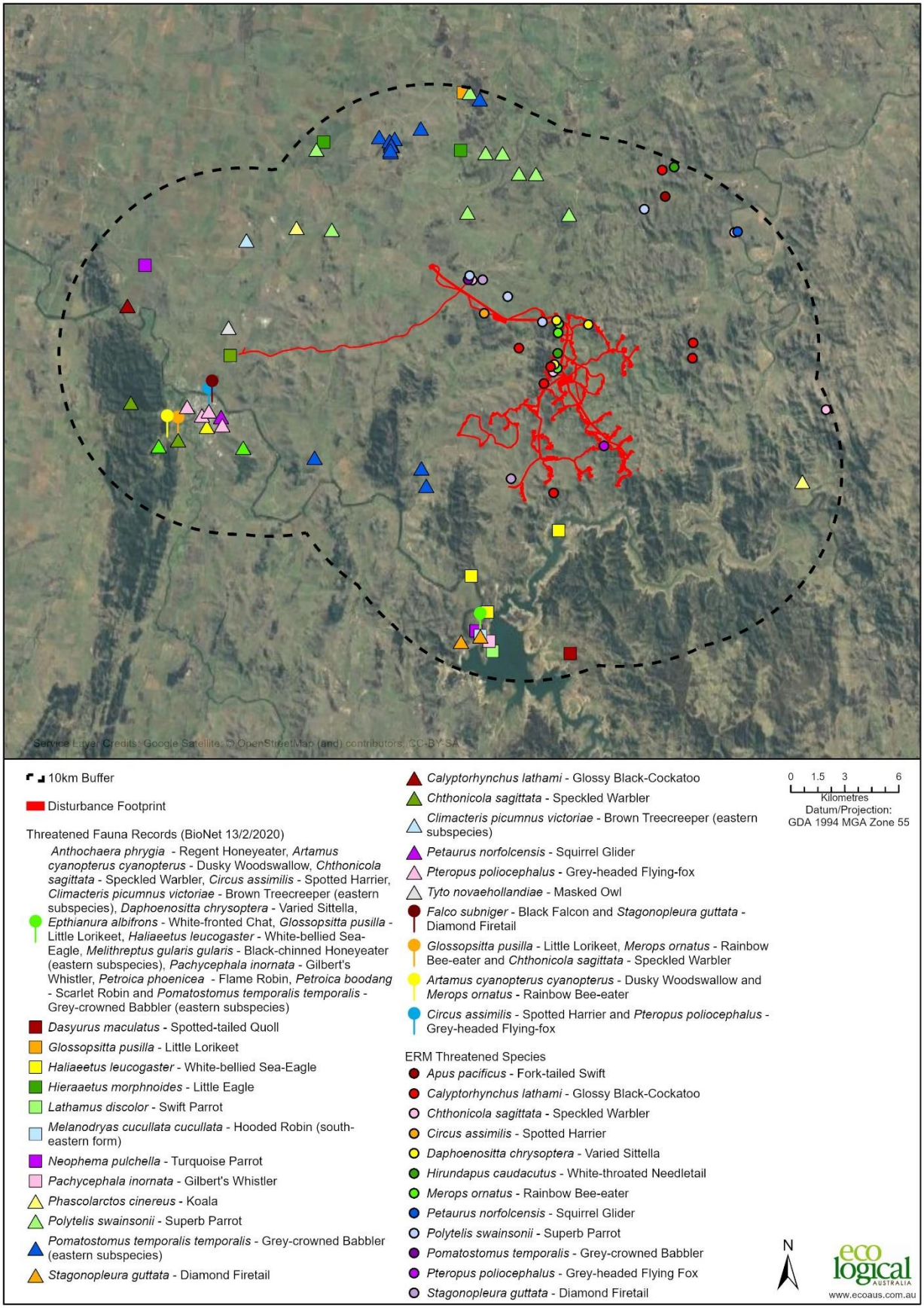

Figure 4.3: Threatened fauna records for the Development Footprint

4.4 Species that cannot withstand further loss

In accordance with Sections 6.5.1.12 and 6.5.1.13 of the FBA, species that cannot withstand further loss in the major catchment must be identified. This information was prescribed by the now repealed *Threatened Species Conservation Act 1995* (TSC Act) and is no longer available.

4.5 Species polygons

Species polygons have been created to determine the area of impact to:

- Koala – nearby records and presence of suitable habitat indicate this species has positional to occur in the Development Footprint, albeit in low numbers.
- Squirrel Glider – this species was recorded in the Study Area by ERM. Presence of suitable habitat indicate this species has positional to occur in the Development Footprint, albeit in low numbers.

Poor and low condition vegetation zones have been excluded from species polygons; these vegetation zones are unlikely to provide suitable habitat for these species. Species polygons for Koala and Squirrel Glider are shown in Figure 4.4 and Figure 4.5 respectively.

Further assessment may be required to determine presence of the following threatened fauna species:

- Brush-tailed Rock-wallaby
- Eastern Pygmy-possum
- Regent Honeyeater.

These species were not recorded within the Study Area during the ERM in 2012 – 2013 targeted surveys. It is further noted that only Regent Honeyeater is known from nearby records in the region. Further assessment for these species will be undertaken, or expert report prepared, once the Development Footprint has been finalised and areas of suitable habitat to be affected by the Project can be definitively identified.

No threatened flora species have been recorded within the Study Area from or since the ERM surveys which were undertaken in accordance with the 2011 DGRs. Five (5) threatened flora candidate species were identified as having the potential to occur in the Development Footprint based on the associated BVTs, presence of suitable habitat and nearby previous records:

- *Acacia ausfeldii* (Ausfeld's wattle)
- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata.*

Whilst none of the above flora species have been recorded in the Study Area, The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat prior to vegetation clearing and micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

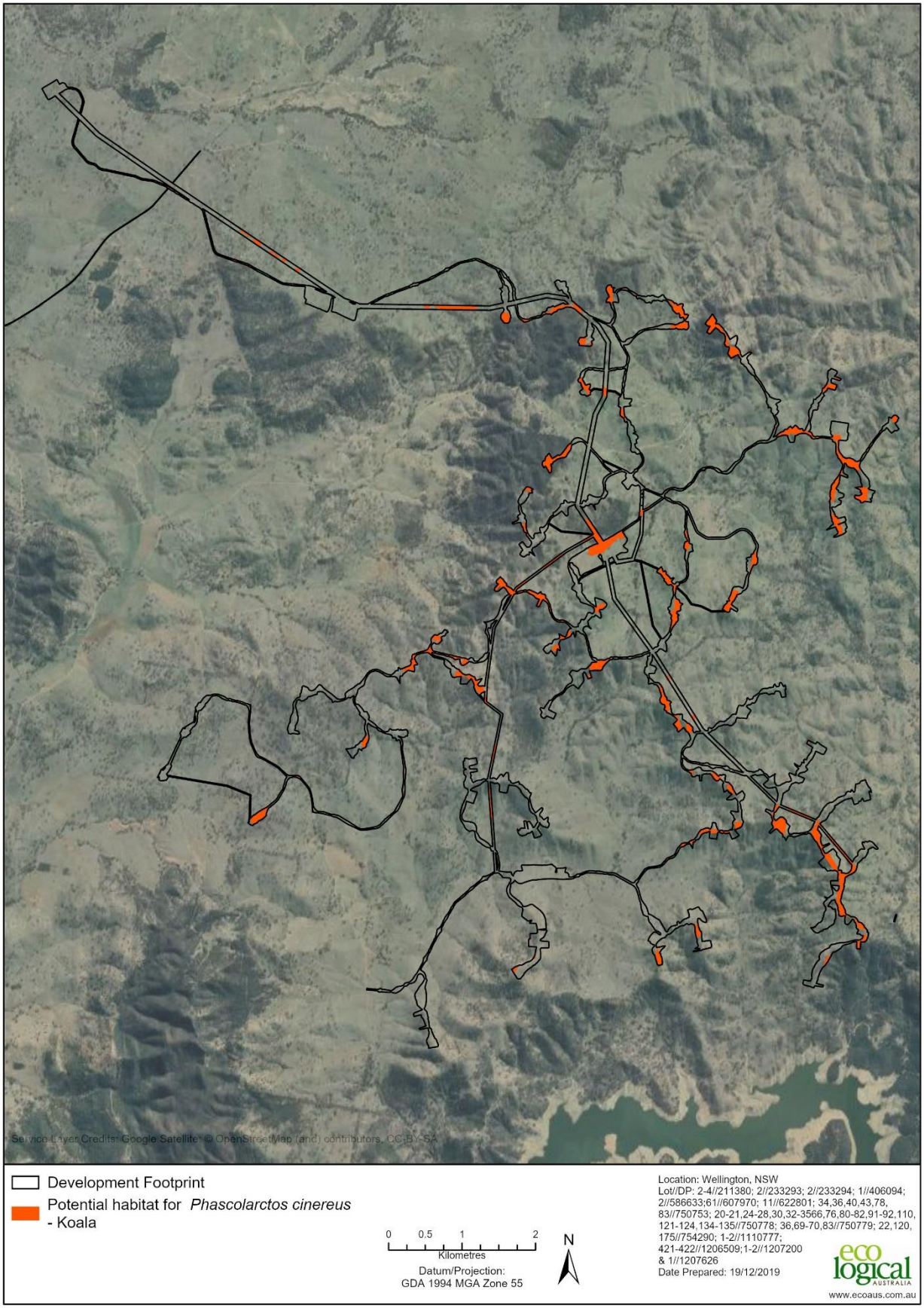

Figure 4.4: Koala species polygon

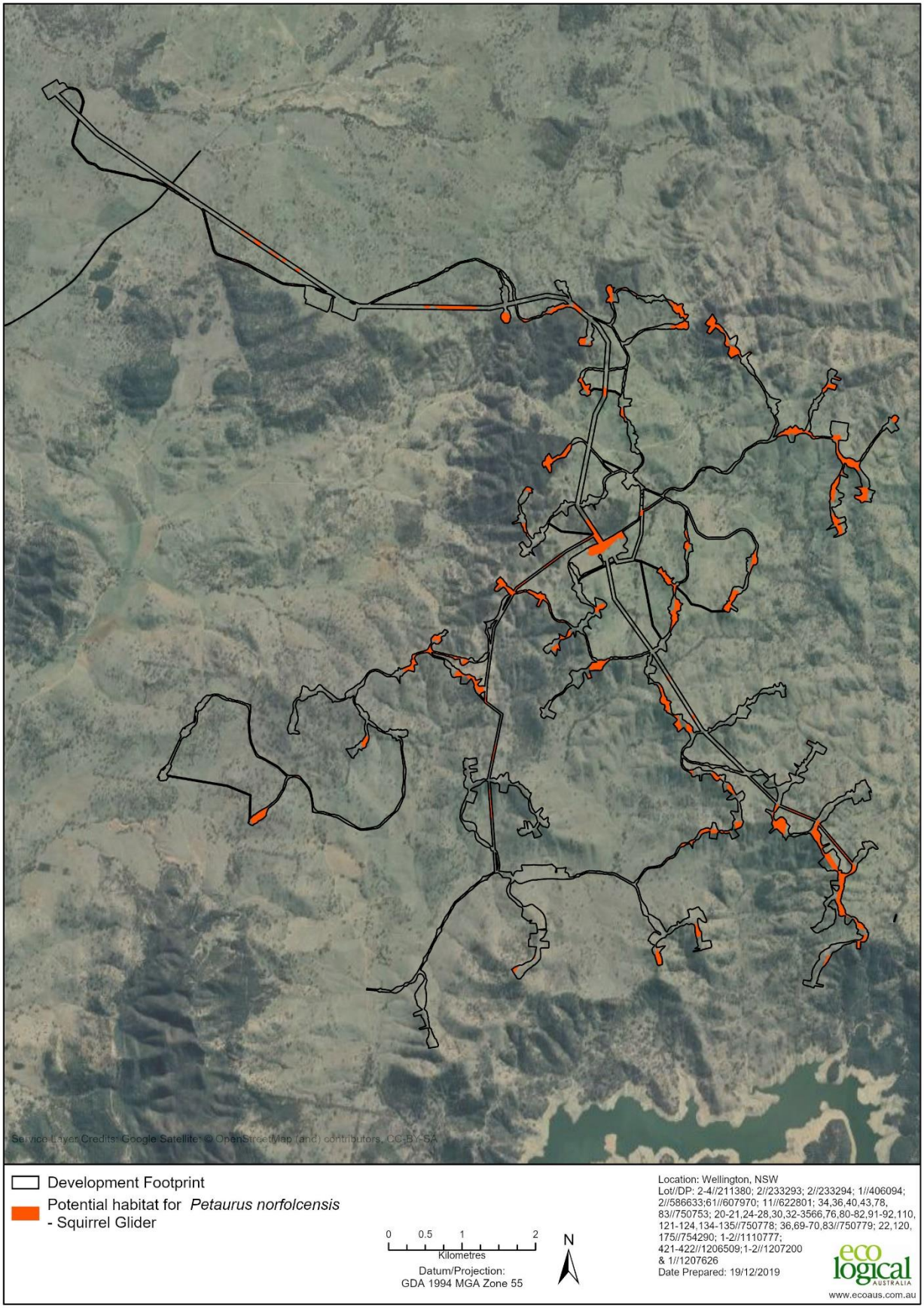

Figure 4.5: Squirrel Glider species polygon

5. Measures to avoid and minimise impacts

5.1 Avoidance of Impacts

Under the FBA The proponent must design the Project to minimise impacts to biodiversity. Specifically, the FBA requires proponents to identify and avoid direct impacts to:

- EEC and CEEC
- Vegetation communities that contain threatened species habitat
- Areas that contain habitat for vulnerable, endangered or critically endangered threatened species or populations
- An area of land that the NSW Minister for Environment has declared as critical habitat in accordance with Section 47 of the (now repealed) TSC Act
- State significant biodiversity links.

The Development Footprint has been subject to considerable revision and reduction since it was first conceptualised and is currently approximately one third the size of the original Project design. The area of native vegetation to be impacted has reduced from 1,880 ha to 639 ha. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.

A summary of the impact avoidance methods of the project are provided below in **Table 5.1**.

Table 5.1: Avoidance of direct impacts

Direct Impact to be Avoided	Method to Avoid Impact
Impacts to EECs and CEECs	The Development Footprint has been revised and reduced from the original design, taking into consideration the mapped areas of EEC/CEEC. This has included removing the eastern extent of the Development Footprint and revising the Development Footprint so that minimal EEC is affected. Detailed ecological surveys will be undertaken pre-construction to further assess and delineate areas of EEC/CEEC. Further refinements will be made to the Development Footprint pre-construction which will aim to avoid and minimise clearing of native vegetation, EEC/CEEC. The assessment of impacts to the EEC/CEEC has been undertaken on an assumption that the area may increase by up to 25%, to 30 ha, under the detailed design; however, this has not been included in the credit calculation as it is unable be assigned to a particular vegetation zone.
Impacts to vegetation that contains threatened species habitat	Vegetation mapped within the Study Area has been identified as potential habitat for threatened species as identified in earlier sections of this report. The Development Footprint has been revised and reduced from the original design, to reduce the area of affected vegetation communities that contain threatened species habitat. Infrastructure will be micro-sited prior to construction. This will involve detailed ecological pre-clearing survey to ensure native vegetation clearing is minimised and avoidance of habitat features is prioritised.

Direct Impact to be Avoided	Method to Avoid Impact
Impacts to areas that contain habitat for Vulnerable, Endangered, or Critically Endangered threatened species or populations in accordance with Step 5 in Section 6.5 of the FBA	The Development Footprint provides potential habitat for threatened species identified in **Section 4**. The revision and reduction in size of the Development Footprint has reduced the amount of habitat affected. Further ecological surveys are proposed to determine presence or absence and avoid impacts to threatened fauna species as detailed in **Section 4.** Infrastructure will be micro-sited prior to construction. This will involve detailed ecological survey to ensure disturbance to threatened species habitat, for example, hollow bearing trees, is minimised and habitat is avoided. Further, any threatened flora species identified in the pre-clearing surveys will be avoided through detailed design.
Impacts to areas of land that the Minister for Environment has declared as critical habitat in accordance with s47 of the TSC Act	Critical habitat has not been identified within the Study Area.
Impacts to riparian areas of 4th order or higher streams and rivers, important wetlands and estuaries	The Development Footprint includes two 4th order ephemeral streams – Uungula Creek, and Ilgingery Creek. Due to historic agricultural practices and absence of riparian vegetation, the creeks are incised and channel banks show evidence of exacerbated erosion. Further impacts from the Project are considered unlikely, however, a range of mitigation measures will be implemented to avoid impacts and improve biodiversity outcomes. These include: • Establishing vegetated riparian zones. • Construction of additional watercourse crossings in areas where watercourses are not meandering, for example on straight sections of channels. • Minimisation of creek crossings for within site access and electrical cabling. • Localised scour protection around building pads. • Sourcing of water from licensed suppliers.
Impacts to state significant biodiversity links	No state significant biodiversity links have been identified within the Development Footprint.

5.2 Site Selection

Site selection was undertaken considering the extent of known biodiversity values, as well as the extent of disturbance within the Development Footprint. A summary of considerations during the selection of the Development Footprint is shown in **Table 5.2**.

Table 5.2: Avoidance and minimisation of direct impacts through site selection

Site Selection Criteria	Method to Avoid Impact
Selecting a suitable development site for a Major Project or a route for linear projects, should be informed by knowledge of biodiversity values. An initial desktop assessment of biodiversity values would assist in identifying areas of native	The Project site is located in an area which has been subject to considerable past disturbance through agricultural clearing. Remnant vegetation is generally degraded and connectivity with surrounding high value vegetation is limited. The Development Footprint has been subject to comprehensive biodiversity assessment to inform the current Development Footprint. These assessments are

Site Selection Criteria	Method to Avoid Impact
vegetation cover, EECs or CEECs, and potential habitat for threatened species	detailed in earlier sections of this report and include, primarily, the assessment completed by ERM in 2013. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
Stage 1 of the FBA will provide the preliminary information necessary to inform project planning. Early consideration of biodiversity values is recommended in site selection, or route selection for linear projects, and the planning phase.	Biodiversity values were identified within the Development Footprint through the assessment process described above. Continued consultation has been undertaken between ELA and CWPR through the development of this BAR to identify any further areas for refinement. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
The site/route selection process should include consideration and analysis of the biodiversity constraints of the proposed development site and consider the suitability of the Major Project based on the types of biodiversity values present on the development site	As identified above, the biodiversity assessment stage was conducted to determine areas of biodiversity constraints. The final Development Footprint will reflect the retention, where possible, of existing biodiversity values within the Development Footprint.
When considering and analysing the biodiversity constraints for the purpose of selecting a development site, the following matters should be addressed: *(a) whether there are alternative sites within the property on which the proposed development is located where siting the proposed Major Project would avoid and minimise impacts on biodiversity values* *(b) how the development site can be selected to avoid and minimise impacts on biodiversity values as far as practicable* *(c) whether an alternative development site to the proposed development site, which would avoid adversely impacting on biodiversity values, might be feasible.*	The Development Footprint will be further refined and reduced as far as practicable and has already included removal of roughly two thirds of the Study Area to avoid biodiversity constraints.
For linear projects, the route selection process must include consideration and an analysis of the biodiversity constraints of the various route options. In selecting a preferred option, loss of biodiversity values must be weighed up and justified against social and economic costs and benefits.	This project is not considered a linear project as per the definition in the FBA. A site-based assessment was chosen as the most suitable assessment method given the overall connected shape of the Development Footprint.

5.3 Planning

Planning was considered during the selection of the Development Footprint. A summary of criteria utilised is shown in

Table 5.3.

Table 5.3: Avoidance and minimisation of direct impacts through planning

Planning Criteria	Method to Avoid Impact
Siting of the project – the Major Project should be located in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower site value score) or which avoid an EEC or CEEC	The Development Footprint has been subject to comprehensive biodiversity assessment to inform the current Development Footprint. These assessments are detailed in earlier sections of this report and included a desktop review of databases and existing information, vegetation validation, full floristic surveys, habitat mapping and threatened fauna surveys. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
Minimise the amount of clearing or habitat loss – the Major Project (and associated construction infrastructure) should be located in areas that do not have native vegetation, or in areas that require the least amount of vegetation to be cleared (i.e. the development footprint is minimised), and/or in areas where other impacts to biodiversity will be the lowest	There are no potential alternative locations, rather, the Development Footprint has been revised and will be reduced as far as practicable in consideration of biodiversity constraints.
Loss of connectivity – some developments can impact on the connectivity and movement of species through areas of adjacent habitat. Minimisation measures may include providing structures that allow movement of species across barriers or hostile gaps	The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys. Riparian vegetation is lacking or degraded within the Development Footprint and will not be subject to any further disconnection. Establishment of vegetated riparian zones will enhance connectivity in the Development Footprint.

5.4 Measures to minimise impacts

The Proponent will implement measures to minimise the impacts of the Project during the construction, operational and decommissioning phase. A Biodiversity Management Plan (BMP) and Bird and Bat Adaptive Management Plan (BBAMP) will be developed to describe the mechanisms for reduction of impacts from the Project. The BMP will address impacts to flora and fauna such as clearing of native vegetation, as well as management for erosion control, and bushfire management. The BMP will include operational measures to reduce impacts of the project such as:

- vegetation clearance protocols
- rehabilitation and revegetation strategies
- weed and pest animal control measures.

Details of measures to minimise impacts during the construction and operational phase are described below.

5.4.1 Measures to minimise direct impacts during construction phase

Several considerations have been given to minimising impacts to biodiversity during the construction phase of the Project. These are detailed below in

Table 5.4.

Table 5.4: Minimisation of direct impacts during the construction phase

Matter considered to minimise impacts	Adopted matters within Development Footprint
Method of clearing – using a method of clearing during the construction phase that avoids damage to retained native vegetation and reduces soil disturbance. For example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	A BMP will be developed, which will describe the measures to minimise impacts during vegetation clearing. These will include the delineation of areas to be cleared, pre-clearance surveys, management of impacts to fauna including specific measures for threatened fauna, and vegetation clearance protocols. Micro-siting will be undertaken to avoid habitat trees and previously unrecorded threatened flora species.
Clearing operations – minimising direct harm to native fauna during actual construction operations through onsite measures such as undertaking pre-clearing surveys, daily fauna surveys and the presence of a trained ecologist during clearing events	Pre-clearing surveys will be undertaken by a qualified ecologist to determine if roosts, nests or dens are present in any trees proposed for clearing An ecologist/wildlife handler will be present to supervise during clearing of identified fauna roosting or nesting habitat, in accordance with best practice methods to relocate fauna in a sensitive manner. Any fauna utilising habitat within the development footprint would be identified and managed to ensure clearing works minimise the likelihood of injuring fauna.
Timing of construction – identifying reasonable measures that minimise the impacts on biodiversity. For example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting, can minimise the impacts of construction activities on biodiversity	Where possible, timing of vegetation clearance will be planned to occur outside of the period between August and March, during the breeding/nesting/nursing time for the majority of avian and micro-bat species, including the species listed in Section 4 of this document, to avoid impacts to fauna during these critical life cycle events. Clearing will be undertaken under the supervision of an ecologist/ wildlife handler to relocate fauna in a sensitive manner in accordance with best practice methods.
Other measures that minimise inadvertent impacts of the Major Project on the biodiversity values – measures such as installing temporary fencing to protect significant environmental features such as riparian zones, promoting the hygiene of construction vehicles to minimise spread of weeds or pathogens, appropriately training and inducting project staff and contractors so that they can implement all measures that minimise inadvertent adverse impacts of the Major Project on biodiversity values.	Other measures to minimise the impacts of the project on biodiversity would include: • Micro-siting of infrastructure • Marking of habitat trees for retention • Sediment controls along drainage lines and creeks to prevent impacts downstream • Assessment of priority weeds in the Development Footprint and appropriate management measures to minimise risk of spreading weeds. • Site specific induction to ensure all Project staff and contractors are aware of biodiversity constraints and their obligations and responsibilities under the Development Consent and BMP.

5.4.2 Measures to minimise indirect impacts during construction phase

During the construction phase the following management actions would be undertaken to minimise indirect impacts during construction as shown in

Table 5.5.

Table 5.5: Minimisation of indirect impacts during the construction phase

Indirect Impact	Method to avoid indirect impact
Sedimentation and run-off – sediment barriers or sedimentation ponds to minimise impacts of the Major Project on biodiversity values on land that is adjoining the development site, and waterways downstream of the development site	Construction and installation of erosion and sediment control structures in accordance with recognised standards will be undertaken. Further details on erosion and sediment controls proposed can be found in the Project EIS and include the establishment of vegetated riparian zones along creek lines. Regular inspection and maintenance of erosion and sediment controls would be undertaken.
Noise, dust or light spill – adopting onsite measures that can minimise the impacts on biodiversity values from noise, dust or light spill during the construction phase. For example, only undertake construction during daylight hours to avoid impacts from light spill where this may be detrimental to species habitat on adjoining lands	Construction works would be restricted to daytime hours where possible to minimise the risk of light spill to surrounding areas. Dust suppression methods, including the use of water carts, would be utilised on unsealed roads and disturbed areas.
Inadvertent impacts on adjacent habitat or vegetation – considering measures such as retaining vegetation on the development site as a buffer to protect significant environmental features (e.g. riparian zones, likely or known threatened species habitat)	The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys. Riparian vegetation is lacking or degraded within the Development Footprint and will not be subject to any further disconnection. Establishment of vegetated riparian zones will enhance connectivity in the Development Footprint.
Feral pest, weed and/or pathogen encroachment into vegetation on land adjoining the development site – one example is using protocols for hygiene that minimise the likelihood of construction vehicles spreading weeds or pathogens from the development site into native vegetation on land adjoining the development site	The BMP to be developed for the Project will include weed and feral animal control protocols. Assessment of priority weeds in the Development Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds will be implemented.
Impacts that are infrequent, cumulative or difficult to measure – where there are likely to be indirect impacts on biodiversity that are infrequent, cumulative or difficult to measure over time, consideration should be given to how an operational monitoring program can be used to assess the timing and/or extent of these impacts. A proposal for an operational monitoring program should be set out in the BAR. Development of a monitoring program may involve determining the base-line information that will be necessary to measure the impact over time. It should also consider how the results of the monitoring program could be used to inform ongoing operations in order to reduce the extent of indirect impacts	Infrequent, cumulative or difficult to measure impacts are not predicted to occur as a result of the Project. Cumulative impacts due to bird and bat strike from the Project and other wind farms in the region will be managed monitored through the implementation of a BBAMP.
Impacts during the operational phase – measures to avoid or minimise the indirect impacts on threatened species and threatened species habitat on land adjoining the development site, migratory species or flight pathways as a result of the operation of the development. Such measures may include those adopted to avoid and minimise: *(i) trampling of threatened flora species*	Native vegetation will be clearly delineated through pre-clearing and micro-siting surveys to reduce risk of encroachment into these areas. Temporary laydown facilities will be located in cleared areas. The use of lighting will be minimised, such as spacing lights out over the areas, to decrease the contrast between lighting and the night-time landscape of the area.

Indirect Impact	Method to avoid indirect impact
(ii) rubbish dumping *(iii) noise* *(iv) light spill* *(v) weed encroachment* *(vi) nutrient run-off* *(vii) increased risk of fire, and* *(viii) pest animals.*	Appropriate management measures to minimise risk of spreading weeds will be implemented. An Emergency Response Plan (ERP) will be developed prior to construction commencing, which will include protocols to reduce the risk of fire during the construction phase.

5.4.3 Measures to minimise impacts during operational phase

Impacts to biodiversity values would be minimised during the operational phase using the methods described in Table 5.6.

Table 5.6: Minimisation of Impacts during the Operational Phase

Operational Phase Impact	Method to Avoid Impact
Seasonal impacts – whether there are likely to be any impacts that occur during specific seasons. Minimisation measures may include amending operational times to minimise impacts on biodiversity during periods when seasonal events such as breeding, or species migration occur	No seasonal management measures are proposed.
Artificial habitats – using 'artificial habitats' for fauna where they may be effective in minimising impacts on such fauna. These include nest boxes, glider-crossings or habitat bridges.	Hollow bearing trees and stags removed for the Project will be retained in areas of adjacent habitat where possible (considering the Project's other land use and environmental management obligations).

6. Impacts on biodiversity that require further consideration

The Project SEARs issued in November 2019 do not specifically include a requirement to further consider any specific impacts on biodiversity. The previous SEARs, issued in December 2016, did however include a requirement to further consider impacts to threatened species. Correspondence received from the DPIE in relation to consideration of the BC Act for the revised 2019 SEARs, states that the requirements of the 2016 SEARs are unchanged. Therefore, although not specifically detailed in the current SEARs, further consideration is given to those threatened species listed in the 2016 SEARs:

- Swift Parrot
- Regent Honeyeater
- *Zieria obcordata*.

It is noted that the 2016 SEARs specifically exclude the White Box Yellow Box Blakely's Red Gum Woodland EEC from requiring further consideration.

6.1 Assessment of further impacts to Swift Parrot

An assessment of further impacts to Swift Parrot in accordance with **Section 9.2.5** of the FBA is detailed below in Table 6.1.

Table 6.1: Assessment of further impacts to Swift Parrot

Criteria	Response
The size of the local population directly and indirectly impacted by the development	There is no known population of this species in the locality. This species was not identified in the ERM bird surveys and there are no records within the Study Area. Isolated records exist to the south of the Study Area, on the banks of Burrendong Dam. The closest record of this species is approximately 7.5 km from the Development Footprint and was recorded in 1991 (Atlas of Living Australia 2020).
The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to: *(i) an estimate of the change in habitat available to the local population as a result of the proposed development* *(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and* *(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.* *Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development*	The Development Footprint contains suitable foraging habitat for this species. In the absence of a known local population, there is potential for this species to forage sporadically in the area. Approximately 140 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 639 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process. The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.

Criteria	Response
The likely impact on the ecology of the local population. At a minimum, address the following for fauna: *– breeding* *– foraging* *– roosting, and* *– dispersal or movement pathways*	Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development	In the absence of a known local population, there is potential for this species to forage sporadically in the area. Further fragmentation or isolation is unlikely to occur as a result of the Project.
The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range	The Swift Parrot has a defined breeding habitat in Tasmania, migrating north to mainland Australia in the autumn and winter months (DPIE 2020b). Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint and will not affect breeding, dispersal or genetic viability of this species.
The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population	Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.	No specific measures are proposed to contribute to the recovery of this species for the Project. Management of riparian zones including the establishment of vegetation may provide improved habitat to individuals foraging sporadically in the area.

6.2 Assessment of further impacts to Regent Honeyeater

An assessment of further impacts to Regent Honeyeater in accordance with Section 9.2.5 of the FBA is detailed below in **Table 6.2**.

Table 6.2: Assessment of further impacts to Regent Honeyeater

Criteria	Response
The size of the local population directly and indirectly impacted by the development	There is no known population of this species in the locality. This species was not identified in the ERM bird surveys and there are no records within the Study Area. Isolated records exist to the south of the Study Area, on the banks of Burrendong Dam. The closet record of this species is 7.5 km from the Study Area and was recorded in 1984 (Atlas of Living Australia 2020).
The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to: *(i) an estimate of the change in habitat available to the local population as a result of the proposed development*	The Study Area contains suitable foraging habitat for this species in the form of flowering eucalypts. In the absence of a known local population, there is potential for this species to forage sporadically in the area. Approximately 140 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable

Criteria	Response
(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and *(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.* *Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development*	foraging habitat for this species, of the total approximately 639 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process. The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.
The likely impact on the ecology of the local population. At a minimum, address the following for fauna: *– breeding* *– foraging* *– roosting, and* *– dispersal or movement pathways*	It is unlikely that the Development Footprint provides suitable breeding habitat for this species, when compared to known breeding sites within the nearby Goulburn and Capertee National Parks (DPIE 2020b). Nonetheless, further survey is recommended for this species prior to construction to confirm presence or absence and quantify impacts. Impacts to this species will likely be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development	In the absence of a known local population, there is potential for this species to forage sporadically in the area. Further fragmentation or isolation is unlikely to occur as a result of the Project.
The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range	It is unlikely that the Development Footprint provides suitable breeding habitat for this species, when compared to known breeding sites within the nearby Goulburn and Capertee National Parks (DPIE 2020b). In the absence of a known local population, impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint and will not affect breeding, dispersal or genetic viability of this species.
The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population	Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.	No specific measures are proposed to contribute to the recovery of this species for the Project. Management of riparian zones including the establishment of vegetation may provide improved habitat to individuals foraging sporadically in the area.

6.3 Assessment of further impacts to *Zieria obcordata*

An assessment of further impacts to *Zieria obcordata* in accordance with Section 9.2.5 of the FBA is detailed below in Table 6.3.

Table 6.3: Assessment of further impacts to *Zieria obcordata*

Criteria	Response
The size of the local population directly and indirectly affected by the development	This species is known from only two sites, one being the local subpopulation comprising approximately 209 plants (DPIE 2020b) located approximately 5 km from the western extent of the Development Footprint.
The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to: *(i) an estimate of the change in habitat available to the local population as a result of the proposed development* *(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and* *(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.* *Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development*	The local population of this species will not be directly affected by the Project. Further impacts to previously unrecorded individuals or populations will be managed through detailed ecological surveys on the final Development Footprint, and detailed design to avoid any impacts.
Address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available: *– pollination cycle* *– seedbanks* *– recruitment, and* *– interactions with other species (e.g. pollinators, host species, mycorrhizal associations)*	The local population of this species is located approximately 5 km from the western extend of the Development Footprint and will not be directly affected by the Project.
A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development	The local population of this species is located approximately 5 km from the western extend of the Development Footprint and will not be directly affected by the Project.
The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range	This species is known from only two sites, one being the local subpopulation, the second being north west of Bathurst comprising approximately 700 plants. The local subpopulation will not be directly affected by the Project and it is unlikely that the two subpopulations interact.
The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population	A BMP would be developed, which would include weed and feral animal control protocols. Assessment of priority weeds in the Project Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds outside of the Development Footprint will be implemented.
The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.	No specific measures are proposed to contribute to the recovery of this species for the Project.

7. Commonwealth matters

For the purposes of assessment under the EPBC Act, the Commonwealth will accredit the FBA. Written confirmation was received from the (former) Department of Environment and Energy in January 2017 that the impacts of the Project are to be assessed under the accredited NSW process.

Notwithstanding, all protected matters that may be affected by the Project must be identified and the significance of impacts must be assessed. **Section 4** of this BAR identifies those threatened species and communities listed under the EPBC Act determined to be known, likely or with the potential to be affected by the Project, and lists those species and communities which will require biodiversity offsets as either ecosystem or species credit species, or for which further assessment is required. Justification is provided where no further assessment is required.

The Protected Matters Search Tool (DAWE 2020a), along with updated NSW BioNet Atlas records and review of the ERM surveys were considered . Table 7.1 below provides a summary of all EPBC Act listed endangered communities which were identified in the data review; EPBC Act listed threatened species are listed in Table 7.2. Those species and communities warranting further assessment are highlighted and confirmed if they are to be offset under the FBA as either species credit or ecosystem credit species.

Further assessment of EPBC Act protected species and communities is included in the EIS for the Project in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (Commonwealth of Australia 2013). It was concluded that no significant impacts will occur to EPBC listed species or communities.

Table 7.1: EPBC Act listed endangered communities

Ecological communities			
Name	**Likelihood of occurrence**	**Potential impact**	**Further EPBC Act assessment required**
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	No – not identified in extensive vegetation mapping of the Study Area	No	No
Natural Temperate Grassland of the South Eastern Highlands	No – not identified in extensive vegetation mapping of the Study Area	No	No

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Known – this community has been identified and mapped in the Development Corridor.	Approximately 11.25 ha of this community would be removed for the current Development Footprint, although this area would be refined following final design and micro-siting. The assessment of impacts to the CEEC has been undertaken on an assumption that the area may increase by up to 25%, to 14 ha, under the detailed design.	Yes. The significance of impact to any increases in the area of CEEC to be cleared will be assessed and where a significant impact is determined, further assessment may be required.

Table 7.2: EPBC Act listed threatened species

Scientific name (Common name)	Likelihood of occurrence	Potential impact	Further assessment required
Anthochaera Phrygia (Regent Honeyeater)	Potential	Removal of potential woodland foraging habitat	Yes
Aprasia parapulchella (Pink-tailed Worm Lizard/Pink-tailed Legless Lizard)	Potential	Unlikely – no records nearby, not identified in ERM survey	No
Botaurus poiciloptilus (Australian Bittern)	Unlikely	No – requires permanent freshwater wetlands	No
Calidris ferruginea (Curlew Sandpiper	Unlikely	No – requires freshwater wetlands or estuarine habitat	No
Chalinolobus dwyeri (Large-eared Pied Bat)	Potential	Removal of woodland foraging habitat	Yes
Dasyurus maculatus (Spotted-tail Quoll)	Unlikely	No -– not identified in extensive survey effort, limited habitat present	No
Delma impar (Striped Legless Lizard)	Potential	Removal of habitat through ground disturbance	Yes
Grantiella picta (Painted Honeyeater)	Potential	Removal of woodland foraging habitat	Yes
Hirundapus caudacutus (White-throated Needletail)	Known	Removal of woodland foraging habitat	Yes
Lathamus discolour (Swift Parrot)	Potential	Removal of woodland foraging habitat	Yes
Leipoa ocellate (Mallee Fowl)	Unlikely	No – suitable woodland habitat not present	No
Litoria booroolongensis (Booroolong Frog)	No	No - requires permanent water streams	No
Motacilla flava (Yellow Wagtail)	Unlikely	No – requires swamp marsh habitat	No
Myiagra cyanoleuca (Satin Flycatcher)	Potential	Migratory species, potential removal of foraging habitat	Yes
Numenius madagascariensis (Eastern Curlew)	Unlikely	No – requires swamp marsh habitat	No

Scientific name (Common name)	Likelihood of occurrence	Potential impact	Further assessment required
Nyctophilus corbeni (Corben's Long Eared Bat)	Potential	Removal of Woodland habitat	Yes
Petrogale penicillate (Brush-tailed Rock-wallaby)	Unlikely	No – Required Rocky escarpments, outcrops and cliffs.	No
Phascolarctos cinereus (Koala)	Potential	Removal of woodland Habitat	Yes
Polytelis swainsonii (Superb Parrot)	Known	Has been observed within the Development Footprint	Yes
Pseudomys novaehollandiae (New Holland Mouse)	Potential	Removal of Woodland Habitat	Yes
Pteropus poliocephalus (Grey-headed Flying-fox)	Likely	Known Flying Fox camp nearby	Yes
Rufous Fantail (Rhipidura rufifrons)	Unlikely	No – Mainly inhabits subtropical and temperate rainforests	No
Rostratula australis (Australian Painted Snipe)	Unlikely	No – Requires swamps dams and marshy areas	No
Dichanthium setosum (Bluegrass)	Unlikely	Removal of cleared woodland and grassland habitat.	Yes
Eucalyptus alligatrix subsp. *alligatrix*	Unlikely	No – This species only occurs within one known area located approximately 74 km South east of the Development Footprint.	No
Eucalyptus cannonii (Capertee Stringybark)	Unlikely	No – The nearest record is located 30 km south east of the Development footprint	No
Euphrasia arguta	Unlikely	No – The nearest record is located 60 km south east of the Development footprint	No
Prasophyllum petilum (Tarengo Leek Orchid)	Unlikely	No – The nearest record is located 73 km south east of the Development footprint	No
Prasopghyllum sp. *Wybong* (C.Phelps ORG 5269)	Unlikely	No – The nearest record is located 140 km East of the Development footprint	No
Persoonia marginata (Clandulla Geebung)	Unlikely	No – Nearest known population is located near Clandulla approximately 75 km South East of the Development footprint	No
Swainsona recta (Small Purple-pea)	Potential	Removal native grassy understorey habitat	Yes
Tylophora linearis	Unlikely	No – The nearest record is located 42 km North west of the Development footprint	No
Zieria obcordata	Potential	Removal native grassy understorey habitat	Yes

8. Impact Summary

The results of the BAR, including the vegetation and threatened species assessment results, were entered into the BBCC. The Development Footprint described in this assessment is indicative only and subject to a detailed design process. It is expected that the offset requirement will be reduced once the final Development Footprint is determined.

8.1 Ecosystem credit requirement

Table 8.1 presents the ecosystem credit requirement for the Project based on the current Development Footprint. The full BBCC reports are included in **Appendix C**.

Table 8.1: Project Ecosystem Offset Requirement

Vegetation zone	BVT	BVT Description	Condition	Approx Area (ha)	Credits
1	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good _Medium	3.57	229
2	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good _Poor	64.72	3,530
3	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Medium	18.69	951
4	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Poor	26	1,099
5	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good _Other	7.21	260
6	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good _Medium	16.66	1,017
7	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good _Poor	11.27	487
8	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good _Medium	7.68	438
9	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good _Poor	48.55	1,993
10	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good _Medium	13.05	592
11	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good _Poor	310.35	13,158
12	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good _Other	72.83	2,822

Vegetation zone	BVT	BVT Description	Condition	Approx Area (ha)	Credits
13	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Low	38.31	412
			Total	**639**	**26,988**

8.2 Species credit requirement

Species credits calculated for Koala and Squirrel Glider based on the current Development Footprint are presented below in Table 8.2. Poor and low condition vegetation zones are unlikely to provide habitat and have been excluded from the calculations.

Table 8.2: Project Species Credit Offset Requirement

Scientific name	Common name	Area (ha) habitat loss	Credits
Phascolarctos cinereus	Koala	139.69	3,632
Petaurus norfolcensis	Squirrel Glider	139.69	3,073

Further assessment may be required to exclude the following species:

- Brush-tailed Rock-wallaby
- Eastern Pygmy-possum
- Regent Honeyeater.

These species were not recorded within the Study Area during the ERM in 2012 – 2013 targeted surveys. It is further noted that only Regent Honeyeater is known from nearby records in the region. Further assessment for these species will be undertaken, or expert report prepared, once the Development Footprint has been finalised and areas of suitable habitat to be affected by the Project can be definitively identified.

No threatened flora species have been recorded within the Study Area from or since the ERM surveys which were undertaken in accordance with the 2011 DGRs. Five (5) threatened flora candidate species were identified as having the potential to occur in the Development Footprint based on the associated BVTs, presence of suitable habitat and nearby previous records:

- *Acacia ausfeldii* (Ausfeld's wattle)
- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata.*

Whilst none of the above flora species have been recorded in the Study Area, The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat prior to vegetation clearing and micro-

siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

9. Biodiversity Offset Strategy

The proposed offset strategy for the Project is to acquire and retire all ecosystem credits, based on the impacts of the final Development Footprint, once available, to be calculated using the BBCC. It is noted that credits calculated by the BBCC following assessment under the FBA will require determination of reasonable equivalent credits as determined by the current Biodiversity Offset Scheme under the BC Act, determined by the Biodiversity Assessment Method (BAM).

CWPR is considering the BOS for the Project and the final BOS to be delivered for the Project will include one of the following offsetting options under the FBA:

- Securing land (land-based offset)
- Securing required credits through the open credit market, and/or
- Payments to the Biodiversity Conservation Fund (established under the BC Act). One of the key functions of the NSW Biodiversity Conservation Trust (BCT) is to secure land-based offsets on behalf of developers who pay into the Biodiversity Conservation Fund (BCT 2018). Through this process the BCT is able to combine offset obligations and funds to establish strategic, larger and more viable offset sites in NSW (NSW Government 2018).

9.1 Land-based offsets

The mechanism to secure land-based offsets is a practical solution that provides security for the proposed offset, but also allows sufficient flexibility for a portion of land to be managed appropriately. Such mechanisms include a stewardship agreement under the BC Act.

CWPR has commenced consultation with surrounding landowners to investigate the options for establishing land-based offsets on neighbouring properties. Preliminary assessments have been undertaken on three properties which has included desktop review of publicly available vegetation community mapping and entry into the BAM Calculator (BAMC). The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with the TEC detailed in **Section 3.1.1** of this report.

Further investigation is required to refine and validate vegetation mapping to determine the offset potential, however, the presence and area (ha) of equivalent vegetation communities indicates that land-based offsets will provide are a viable mechanism to secure and retire the required biodiversity offset credits.

The final offset strategy, including the mechanism to provide for the long-term security of the offset area will be discussed and agreed upon between DPIE and CWPR.

Once a suitable offset has been identified the following will be provided to DPIE:

- Description of the proposed offset property
- The mechanism proposed to secure the offset for biodiversity outcomes
- Ecosystem credit summary

- Species credits
- Management actions to improve biodiversity values.

Management actions would be implemented to manage native vegetation in the offset following approval of the Project. These include:

- Determining benchmark criteria for native vegetation and habitat condition at the site
- Enhancing the quality of native vegetation and habitat
- Restoring native vegetation and habitat through support of natural regeneration, targeted vegetation establishment, and potentially through the introduction of habitat features (fallen logs, tree hollows)
- Land Management issues such as salinity, erosion, weeds and feral pests through targeted management programs
- Controlling access to the site through installation and maintenance of fencing and gates;
- Bushfire management, including access trails and fire breaks
- A comprehensive monitoring program to determine the success of management actions to improve biodiversity values and progress the condition of the native vegetation and habitat towards the benchmark state.

10. References

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NSW Department of Planning, Industry and Environment (DPIE) 2020c. NSW BioNet Vegetation Classification.

NSW Department of Planning, Industry and Environment (DPIE) 2020d. Archived BioMetric and Threatened Species Profiles datasets.

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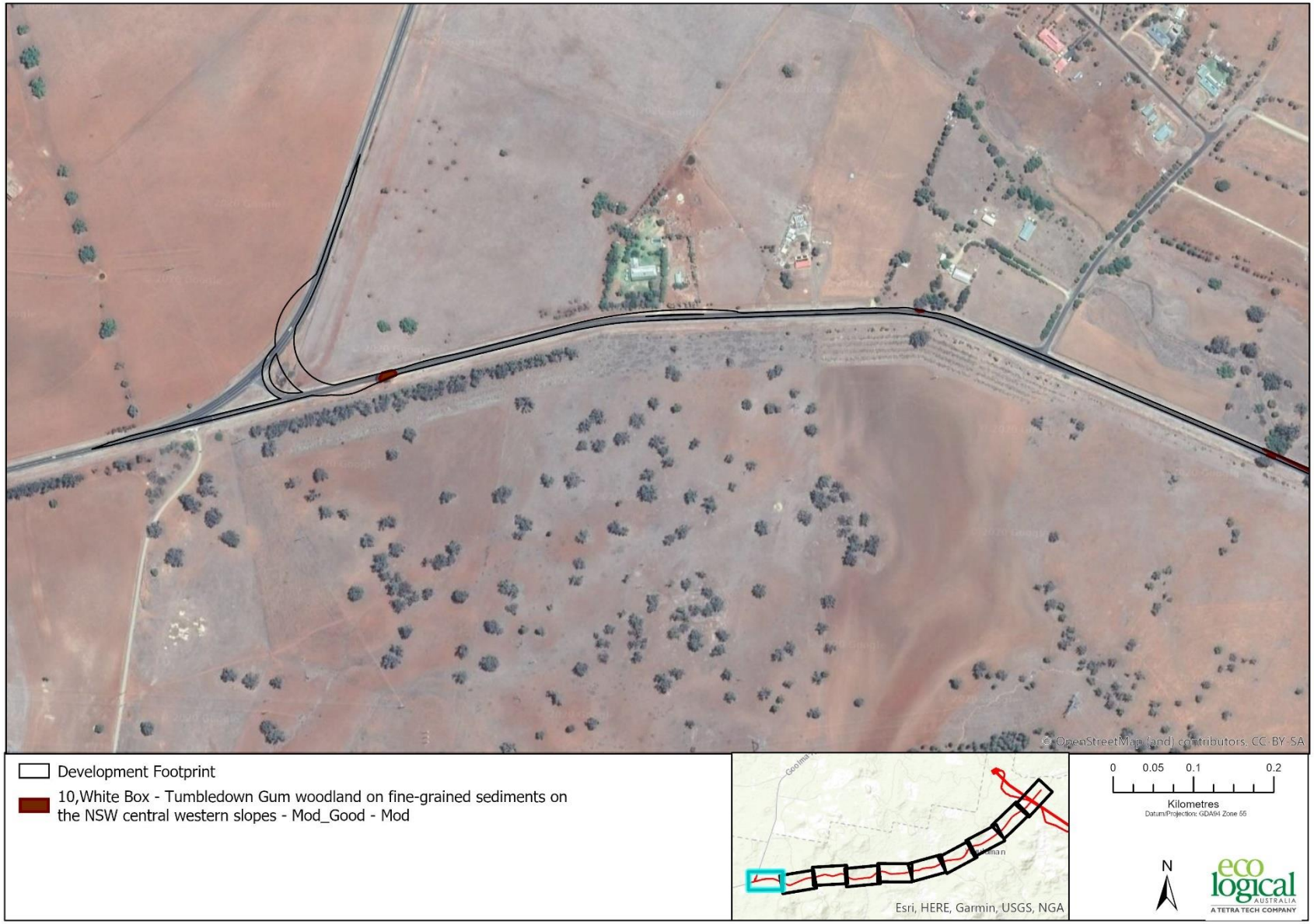
Appendix A Twelve Mile Road – Detailed vegetation mapping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Development Footprint
10,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Mod
Esri, HERE, Garmin, USGS, NGA
0 0.05 0.1 0.2
Kilometres
Datum/Projection: GDA94 Zone 55
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A TETRA TECH COMPANY


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Development Footprint
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Esri, HERE, Garmin, USGS, NGA
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Development Footprint
10,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Mod
Esri, HERE, Garmin, USGS, NGA
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Development Footprint
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Esri, HERE, Garmin, USGS, NGA
0 0.05 0.1 0.2
Kilometres
Datum/Projection: GDA94 Zone 55
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Development Footprint
10,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Mod
Esri, HERE, Garmin, USGS, NGA
0 0.05 0.1 0.2
Kilometres
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Development Footprint
1,Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod_Good - Mod
8,White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod_Good - Mod
10,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Mod
Esri, HERE, Garmin, USGS, NGA
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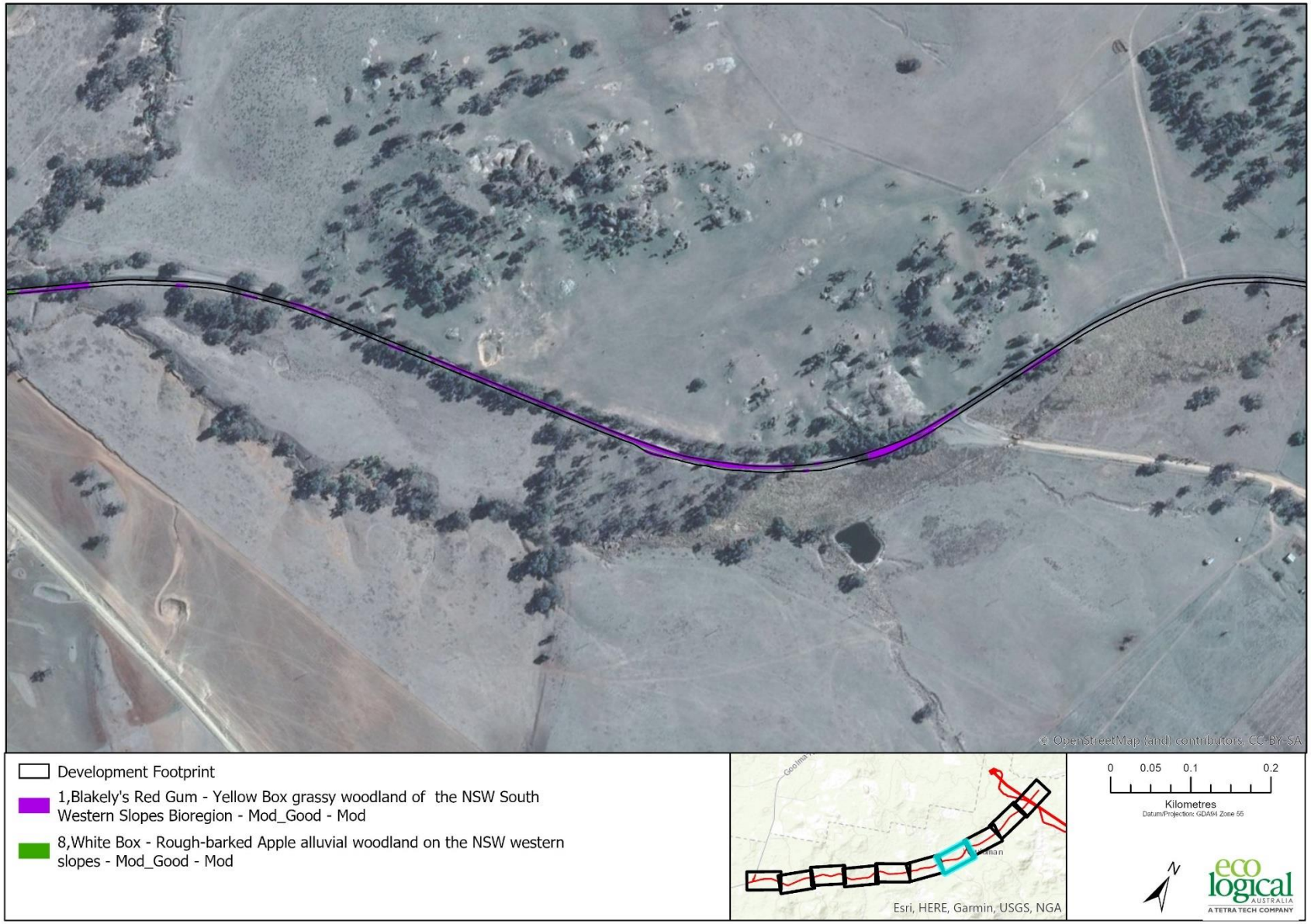
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Development Footprint
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8,White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod_Good - Mod
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Development Footprint
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Esri, HERE, Garmin, USGS, NGA
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Kilometres
Datum/Projection: GDA94 Zone 55
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Development Footprint
1,Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod_Good - Mod
11,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Poor_Grslnd
Non-Native Vegetation
Esri, HERE, Garmin, USGS, NGA
0 0.05 0.1 0.2
Kilometres
Datum/Projection: GDA94 Zone 55
eco logical AUSTRALIA
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Development Footprint
2,Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod_Good - Poor_Grslnd
8,White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod_Good - Mod
11,White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod_Good - Poor_Grslnd
Non-Native Vegetation
Esri, HERE, Garmin, USGS, NGA
0 0.05 0.1 0.2
Kilometres
Datum/Projection: GDA94 Zone 55
eco logical AUSTRALIA
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Appendix B Plot and transect data

PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW112	Moderate/Good_Medium	CW112Y	16	26.5	8.5	64	0	10	0	0	1	31	718795.9	6403786	55
CW112	Moderate/Good_Medium	CW112AB	20	13.5	3	74	0	6	8	0	1	23	720974.4	6403791	55
CW112	Moderate/Good_Poor	CW112AF	10	0	5	28	0	44	28	0	0	0	703290.4	6401130	55
CW112	Moderate/Good_Poor	CW112P	7	2.7	0	0	0	30	70	0	0	44	703652.3	6401532	55
CW112	Moderate/Good_Poor	CW112U	15	0	0	64	0	26	6	0	0	0	699876.7	6401780	55
CW112	Moderate/Good_Poor	CW112Q	15	29.5	0.5	42	0	4	32	0	1	71.5	702965.4	6404427	55
CW112	Moderate/Good_Poor	CW112AC	16	0	0	54	0	12	28	0	0	0	717800.1	6410366	55
CW177	Moderate/Good_Medium	CW177V	22	28.5	6	32	2	14	0	0	0	122	701826	6398737	55
CW177	Moderate/Good_Medium	CW177E	5	7.5	0	0	0	0	100	2	1	31	702422	6399826	55
CW177	Moderate/Good_Medium	CW177F	25	26	1.5	32	0	18	4	0	0	177	701581	6401603	55
CW177	Moderate/Good_Poor	CW177S	6	16.7	0	0	0	6	50	0	0	102	702762.1	6401101	55
CW177	Moderate/Good_Poor	CW177X	23	5.5	0	78	1	2	0	0	0.33	50	703050.5	6401631	55
CW177	Moderate/Good_Poor	CW177Y	24	6	0	82	2	6	2	0	0	104	702932.4	6401698	55
CW177	Moderate/Good_Poor	CW177N	12	60	0	4	0	0	56	2	0	89	727819.4	6404089	55
CW177	Moderate/Good_Other	CW177U	9	28.7	0	2	0	8	38	3	0	54	702728.4	6400603	55
CW177	Moderate/Good_Other	CW177T	12	0	0	6	0	6	58	0	0	27	702857.7	6400604	55
CW177	Moderate/Good_Other	CW177Q	13	12	0	20	4	14	4	0	0	53	703867.7	6401503	55
CW202	Moderate/Good_Medium	CW202U	22	38.5	9	20	9	18	6	1	1	110	701662.9	6398178	55
CW202	Moderate/Good_Medium	CW202T	12	2.5	0	22	0	8	56	0	0	13	697709.4	6402464	55
CW202	Moderate/Good_Medium	CW202AD	19	34	0.5	32	0	16	6	0	0.33	127	715202.3	6406394	55
CW202	Moderate/Good_Poor	CW202W	22	3	0	48	0	40	4	0	0	184	702621.8	6397362	55

PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW202	Moderate/Good_Poor	CW202V	17	0	7.5	56	0	22	6	0	1	71	701758.7	6398975	55
CW202	Moderate/Good_Poor	CW202Q	12	10	0	24	0	8	32	0	0	143	702682.4	6397236	55
CW211	Moderate/Good_Medium	CW211O	24	33	1	48	0	10	0	0	0.66	46	702766.7	6402342	55
CW211	Moderate/Good_Medium	CW211AD	18	4.5	12	52	1	2	38	0	0	12	702887.2	6402816	55
CW211	Moderate/Good_Medium	CW211AB	25	32	0	62	0	8	14	0	0	38	703121.8	6403644	55
CW211	Moderate/Good_Poor	CW211P	13	51.5	0	0	3	2	88	1	0.5	50	703376.8	6397522	55
CW211	Moderate/Good_Poor	CW211S	10	0	0	54	0	14	28	0	0	0	704630.1	6398449	55
CW211	Moderate/Good_Poor	CW211R	15	0	0	56	0	26	16	0	0	1	704594	6398941	55
CW211	Moderate/Good_Poor	CW211AC	14	0	0	94	0	2	6	0	0.33	0	702974	6403119	55
CW212	Moderate/Good_Medium	CW212AI	3	22	0	0	0	0	8	0	0	26	702382	6397198	55
CW212	Moderate/Good_Medium	CW212AX	14	8.3	0	58	0	30	4	1	2	77	708379.1	6403789	55
CW212	Moderate/Good_Medium	CW212AJ	28	37.5	0	50	0	18	6	0	0.5	34	703106	6404897	55
CW212	Moderate/Good_Poor	CW212R	10	0	0	0	0	16	84	0	0	70	704499.2	6396067	55
CW212	Moderate/Good_Poor	CW212AN	12	0	0	78	0	12	6	0	0	22	701833.5	6398366	55
CW212	Moderate/Good_Poor	CW212AM	16	2.5	0	76	0	14	4	1	0	52	702088.7	6398596	55
CW212	Moderate/Good_Poor	CW212AZ	14	29	18	6	38	46	0	1	0.67	115	702298	6402043	55
CW212	Moderate/Good_Poor	CW212V	12	0	0	28	0	10	58	2	0	40	702962.6	6396971	55
CW212	Moderate/Good_Poor	CW212Z	12	0	0	16	0	6	44	0	0	45	702978.1	6399299	55
CW212	Moderate/Good_Poor	CW212AK	14	21.5	0	74	0	4	8	0	0	59	701992.7	6401922	55
CW212	Moderate/Good_Other	CW212AC	7	9.5	0	0	0	4	78	2	0	20	705796.8	6394585	55
CW212	Moderate/Good_Other	CW212AA	10	21	0	0	0	4	66	1	0	50	704740.7	6394672	55
CW212	Moderate/Good_Other	CW212S	10	4.7	0	2	0	2	80	5	0	38	704076.8	6396018	55
CW212	Moderate/Good_Other	CW212B	3	27	0	0	0	0	94	4	0	78	702852	6396832	55

PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW212	Moderate/Good_Other	CW212AF	7	2	0	18	0	4	62	0	0	46	703739.3	6398039	55
CW212	Moderate/Good_Other	CW212AB	7	1.7	0	0	0	0	94	1	0	64	705227	6394741	55
CW212	Moderate/Good_Other	CW212T	5	5.7	0	0	0	2	11	10	0	65	703723	6396402	55
CW212	Moderate/Good_Other	CW212X	9	37	0	0	0	10	16	0	0	53	702399	6397443	55
CW212	Low	CW212AD	8	0	0	0	0	14	92	0	0	6	702121	6394701	55
CW212	Low	CW212U	8	0	0	20	0	6	54	0	0	0	703620.5	6397029	55
CW212	Low	CW212W	5	0.4	0	0	0	2	36	2	0	34	702450.5	6397381	55
CW212	Low	CW212Y	6	1	0	0	0	24	22	1	0	55	702925.6	6397713	55

Appendix C BioBanking Credit Calculator - Credit Report

BioBanking Credit Calculator

Ecosystem credits

Proposal ID :	145/2020/5048MP
Proposal name :	Uungula Wind Farm
Assessor name :	Lily Gorrell
Assessor accreditation number :	145
Tool version :	v4.0
Report created :	28/02/2020 11:05

Assessment circle name	Landscape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
One	22.20	CW112_Moderate/Good_Medium	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	1	3.57	78.00	0.00	78.00	229	229	Masked Owl	72.22	3.00	229
One	22.20	CW112_Moderate/Good_Poor	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	2	64.72	65.33	0.00	65.33	3,530	3,530	Masked Owl	61.11	3.00	3,530
One	22.20	CW177_Moderate/Good_Medium	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	3	18.69	60.42	0.00	60.42	0	951	Masked Owl	55.56	3.00	951
One	22.20	CW177_Moderate/Good_Poor	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	4	26.00	48.96	0.00	48.96	0	1,099	Masked Owl	55.56	3.00	1,099
One	22.20	CW177_Moderate/Good_Other	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Other	Yes	5	7.21	40.62	0.00	40.62	0	260	Masked Owl	38.89	3.00	260
One	22.20	CW202_Moderate/Good_Medium	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	6	16.66	73.96	0.00	73.96	0	1,017	Masked Owl	100.00	3.00	1,017
One	22.20	CW202_Moderate/Good_Poor	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	7	11.27	50.17	0.00	50.17	0	487	Masked Owl	61.11	3.00	487
One	22.20	CW211_Moderate/Good_Medium	White Box - Rough-barked Apple alluvial woodland of the NSW central western slopes including in the Mudgee region	Moderate/Good_Medium	Yes	7	7.68	68.67	0.00	68.67	438	438	Masked Owl	77.78	3.00	438

Assessment circle name	Landscape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
One	22.20	CW211_Moderate/Good_Poor	White Box - Rough-barked Apple alluvial woodland of the NSW central western slopes including in the Mudgee region	Moderate/Good_Poor	Yes	9	48.55	47.33	0.00	47.33	1,993	1,993	Masked Owl	61.11	3.00	1,993
One	22.20	CW212_Moderate/Good_Medium	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Medium	Yes	10	13.05	53.12	0.00	53.12	0	592	Masked Owl	55.56	3.00	592
One	22.20	CW212_Moderate/Good_Poor	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Poor	Yes	11	310.35	49.13	0.00	49.13	0	13,158	Masked Owl	77.78	3.00	13,158
One	22.20	CW212_Moderate/Good_Other	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Other	Yes	12	72.83	44.27	0.00	44.27	0	2,822	Masked Owl	61.11	3.00	2,822
One	22.20	CW212_Low	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Low	Yes	13	38.31	20.83	0.00	20.83	0	0		0.00	0.00	412

BioBanking Credit Calculator

Species credits

NSW GOVERNMENT Office of Environment & Heritage

Proposal ID : 145/2020/5048MP
Proposal name : Uungula Wind Farm
Assessor name : Lily Gorrell
Assessor accreditation number : 145
Tool version : v4.0
Report created : 28/02/2020 11:05

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
Petaurus norfolcensis	Squirrel Glider	2.20	No		139.69	0.00	No	3,073
Phascolarctos cinereus	Koala	2.60	No		139.69	0.00	No	3,632

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