Appendix 7

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DEVCORE

Biodiversity Development Assessment Report for 129 Marys Mount Road, Goulburn NSW

FINAL

March 2022

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Biodiversity Development Assessment Report for 129 Marys Mount Road, Goulburn NSW

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
DEVCORE

Project Director:	David Moore
Project Manager:	Natasha Crook
Report No.	21752/R01
Date:	March 2022

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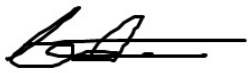
Declaration

In accordance with Section 6.15 of the Biodiversity Conservation Act 2016, it is hereby certified that:

- This assessment has been prepared by a person accredited under the Biodiversity Conservation Act 2016
- This assessment has been prepared in accordance with the brief provided by the client
- All field workers involved in the preparation of this Project were appropriately licensed under the Biodiversity Conservation Act 2016
- The information presented in this report is a true and accurate record of the study findings in the opinion of the authors
- As an accredited person, the author recognises the obligations of an accredited person detailed within the Accredited Person Code of Conduct
- This report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted

Accredited Assessor Signature:  Date: 1/03/2022

Accredited Assessor Name: Natasha Crook

Accredited Assessor Number: BAAS18043

Disclaimer

Document Status

Rev No.	Reviewer		Approved for Issue	
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01	D. Moore	04/11/2021	David Moore	04/11/2021
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Executive Summary

In response to the Deferred Commencement Conditions under DA/0311/1617 DevCore Property Group, on behalf of Goulburn Estates No 1 Pty Ltd, is seeking approval for a residential subdivision (the Project) at 129 Mount Mary Road, Goulburn NSW. This Biodiversity Development Assessment Report (BDAR) has been prepared by Umwelt for Devcore to respond specifically to Condition A set out in the Deferred Commencement Conditions. Condition A requires:

> *A BDAR be prepared that is consistent with the provisions of the Biodiversity Conservation Act for endorsement by the Office of Environment and Heritage and Council. The report is to include acceptable solutions to demonstrate that the proposed development will not have a significant and irreversible impact on any threatened species or endangered ecological community within the Project.*

The Project is located in Lot 1 DP920161, Lot 1 DP1225759 and Lot 1 DP981909 in the Goulburn Mulwaree local government area (LGA). The Project Area covers 41.08 hectares (ha) with a total disturbance area (Development Footprint) of 31.96-ha area.

Devcore has created a masterplan (**Figure 1.3**) that incorporates the stage 1 DA and proposed future stage 2 and stage 3 DA's. The Project is zoned completely as residential (either R2 Low Density Residential or RU6 Transition). The masterplan vision was to consider and protect the majority of native vegetation with ecological value within the Project and retain an ecological corridor through the residential estate from Marys Mount Road to the northern boundary of the Project. There was a specific focus to minimise impacts to higher quality vegetation, mature woodland, hollow-bearing trees, and associated fauna habitat. The resulting plan delivers on this vision in full and creates a masterplan that protects the retained ecological corridor, creating a central place and outlook for the future residents and users of the site.

Surveys of the Development Footprint identified 10.65 ha of native vegetation comprising one Plant Community Type (PCT) with three condition classes 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-eastern Highlands Bioregion. Condition classes comprise the following vegetation zones:

- Zone 1: Moderate/High Native Woodland (0.71 ha)
- Zone 2: Moderate/High Native Derived Grassland (2.68 ha)
- Zone 3: Low Native Derived Grassland (7.26 ha).

PCT 1330 represented in all zones corresponds directly to a Threatened Ecological Community (TEC) in the Development Footprint and is consistent for listing as critically endangered *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes,* South *East Corner and Riverina Bioregions* under the *Biodiversity Conservation Act 2016* (BC Act), and critically endangered *Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Habitat for one threatened fauna species credit species was determined to be present in the Development Footprint for Little Eagle (*Hieraaetus morphnoides*) which was surveyed and assumed present with 7.38 ha of breeding habitat impacted. Importantly all large mature hollow bearing trees have been avoided and no habitat features of these types are directly impacted.

Critically endangered *Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* listed under the BC Act is identified as a candidate TEC for serious and irreversible impacts, and relevant information to assist the decision maker in making an assessment of serious and irreversible impacts is provided. The project has sought to avoid and minimise the impacts and to retain the site where feasible (**Section 4.1** and **Section 4.2**).

Following the application of avoidance and mitigation measures, the BAM assessment identified the following biodiversity credits required to offset the impacts of the Project:

- 150 ecosystem credits for 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-eastern Highlands Bioregion
- 65 species credits for Little Eagle.

A Biodiversity Offset Strategy would deliver appropriate compensation for the unavoidable loss of biodiversity values as a result of the Project as required under the BC Act. This combined with the masterplan being designed to avoid and minimised the impacts on the ecological values of the site where feasible.

Glossary of Acronyms

Acronym	Description
BAM	Biodiversity Assessment Methodology
BAM-C	BAM Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Regulation	NSW *Biodiversity Conservation Regulation 2017*
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Site Assessment Report
CEEC	Critically Endangered Ecological Community
DBH	Diameter at Breast Height
DNG	Derived Native Grasslands
DAWE	Commonwealth Department of Agriculture, Water and Environment
EP	Endangered Population
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
GIS	Geographical Information System
IBRA	Interim Biogeographic Regionalisation for Australia (Version 7)
LEP	Local Environment Plan
LGA	Local Government Area
MGA	Map Grid of Australia
MNES	Matters of National Environmental Significance
BCD	NSW Biodiversity and Conservation Division (formerly OEH)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
VIS	Vegetation Information System

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1.0 Introduction

In response to the Deferred Commencement Conditions under DA/0311/1617 DevCore Property Group, on behalf of Goulburn Estates No 1 Pty Ltd, is seeking approval for a residential subdivision (the Project) at 129 Mount Mary Road, Goulburn NSW. The subject land (the Project Area) comprises Lot 1 DP920161, Lot 1 DP1225759 and Lot 1 DP981909 in the Goulburn Mulwaree local government area (LGA) (the Project Area; **Figure 1.1**). The Project Area covers 41.08 hectares (ha) currently used for agricultural activities. The proposed development incorporates subdivisions of the site to create residential lots of varying sizes. The proposed development includes three stages, for which the total area of disturbance, the 'Development Footprint', would be 31.96 ha (**Figure 1.2**).

Preparation of a Biodiversity Development Assessment Report (BDAR) in accordance with the Biodiversity Assessment Method (BAM) (DPIE 2020) is required under the NSW *Biodiversity Conservation Act* (BC Act) as the extent of native vegetation clearance exceeds the applicable native vegetation clearance threshold (i.e., 0.25 ha of clearing of native vegetation based on the applicable minimum lot size) as outlined in Clause 7.2 of the *Biodiversity Conservation Regulation 2017* (BC Regulation).

This BDAR has been prepared by Umwelt Environmental and Social Consultants (Umwelt) to assess the potential biodiversity impacts of the Project in accordance with the BAM. All three stages of development constitute the proposal for the purposes of this BDAR.

1.1 Project Description

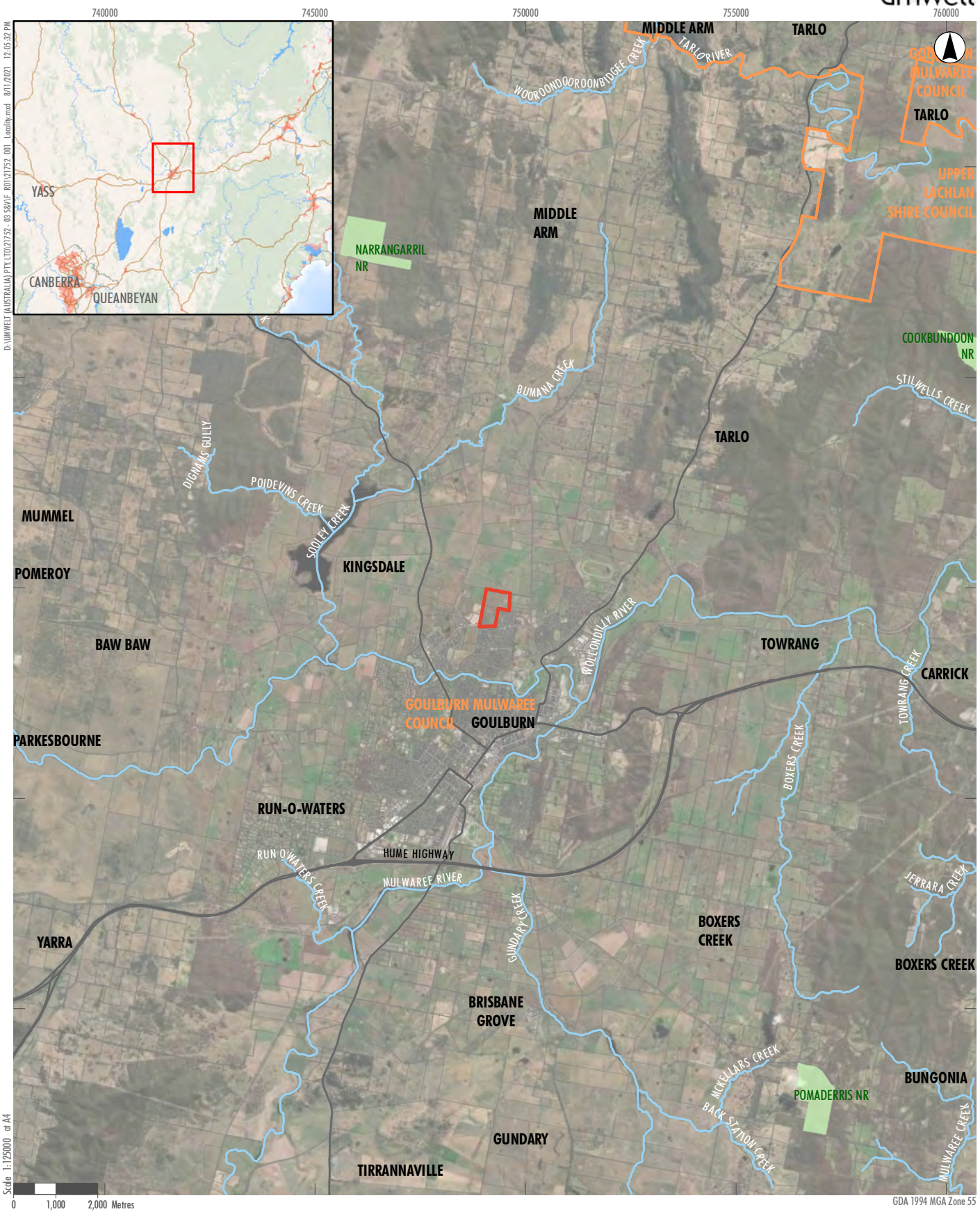
The Project is a residential development comprising residential lots, including bioretention basins, roads, batters, services, and infrastructure. The project comprises a sub-footprint with 205 residential lots with associated infrastructure along the western boundary and northeast corner of the Development Footprint.

The project has been granted development consent by Goulburn Mulwarre Council subject to the Deferred Commencement Conditions outlined in the *Notice of* Determination *of a Development Application* (Goulburn Mulwarre Council, 2018). The Deferred Commencement Conditions states:

> *The applicant must prepare a Biodiversity Development Assessment Report consistent with the provisions of the Biodiversity Conservation Act 2016 for the endorsement by the Office of Environment and Heritage and Council. This report must include acceptable solutions to demonstrate that the proposed development will not have a significant and irreversible impact on any threatened species or endangered ecological community within the subject site.*

DevCore Property Group, on behalf of Goulburn Estates No.1, intend to develop the Project in three Stages (**Figure 1.2**). All stages are addressed in this BDAR, with credit yields from each presented separately, the total footprint for Stage 1 is 24.33 ha, for Stage 2 is 7.21 ha and Stage 3 is 0.42 ha. For the purposes of this assessment, it has been assumed that all native vegetation within the Development Footprint would be cleared for bulk earthworks. No direct impacts would occur outside the Development Footprint. This BDAR assesses the Development Footprint comprising the footprint layout and includes assessment of landscape features, vegetation zones, and threatened species habitat and to account for the full nature of potential impacts, including indirect impacts (refer to **Table 5.2**, **Section 5.1.2**).

Direct impacts to the majority of the structural woodland (Vegetation Zone 1) and some adjacent derived grassland (Vegetation Zones 2 and 3) would be avoided. A 50 m buffer has been applied adjacent to the Development Footprint to account for the indirect impacts.



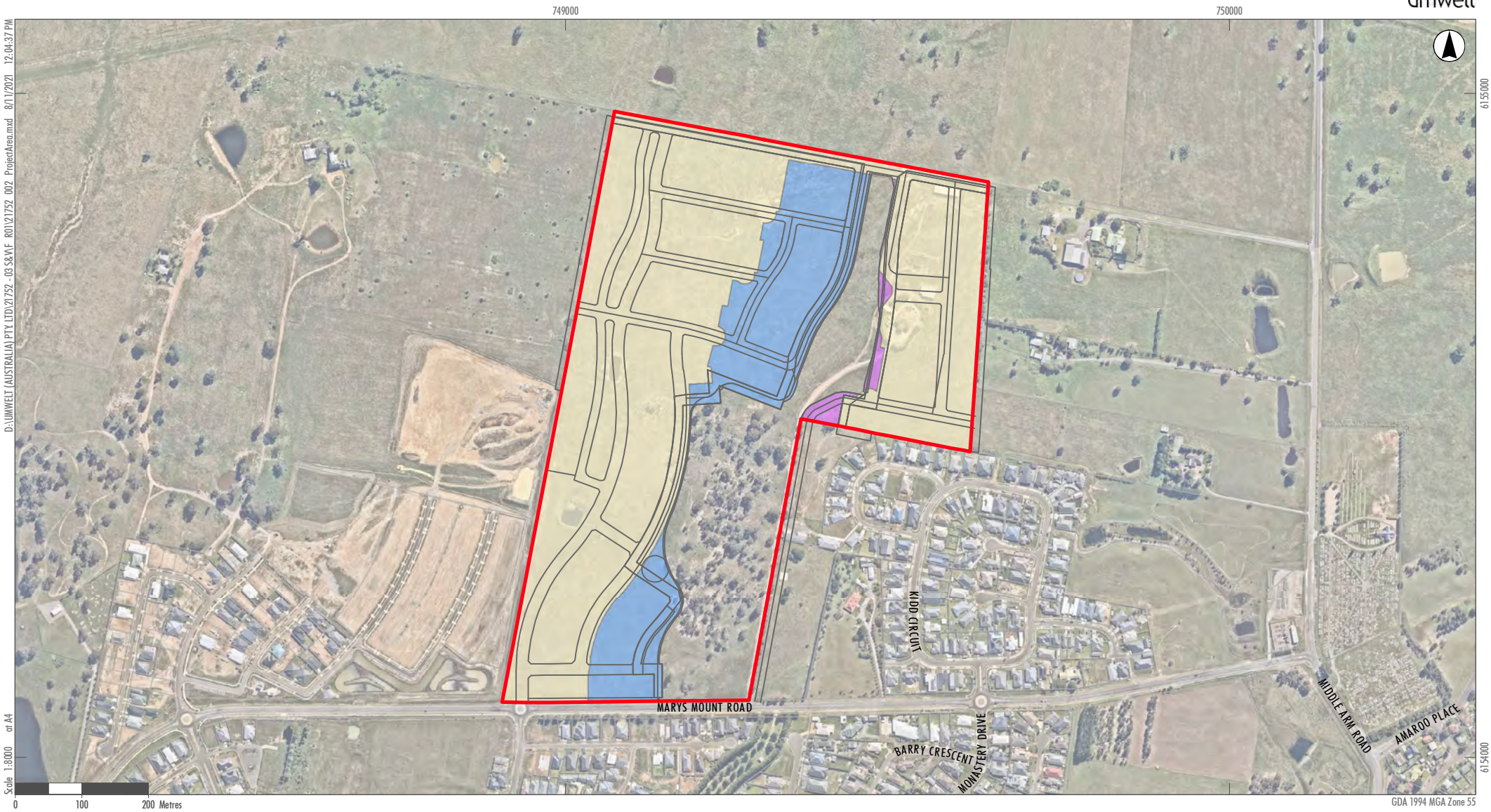
Legend

- Project Area
- Local Government Area
- NPWS Reserve
- Main Roads
- Watercourse

FIGURE 1-1

Locality

Image Source: ESRI Imagery (2021) Data source: NSW DSFI (2021)



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Proposed Layout
- Property Boundaries

FIGURE 1-2

Project Area and Development Footprint

Image Source: Nearmap (2021) Data source: DevCore (2021); NSW DSFI (2021)

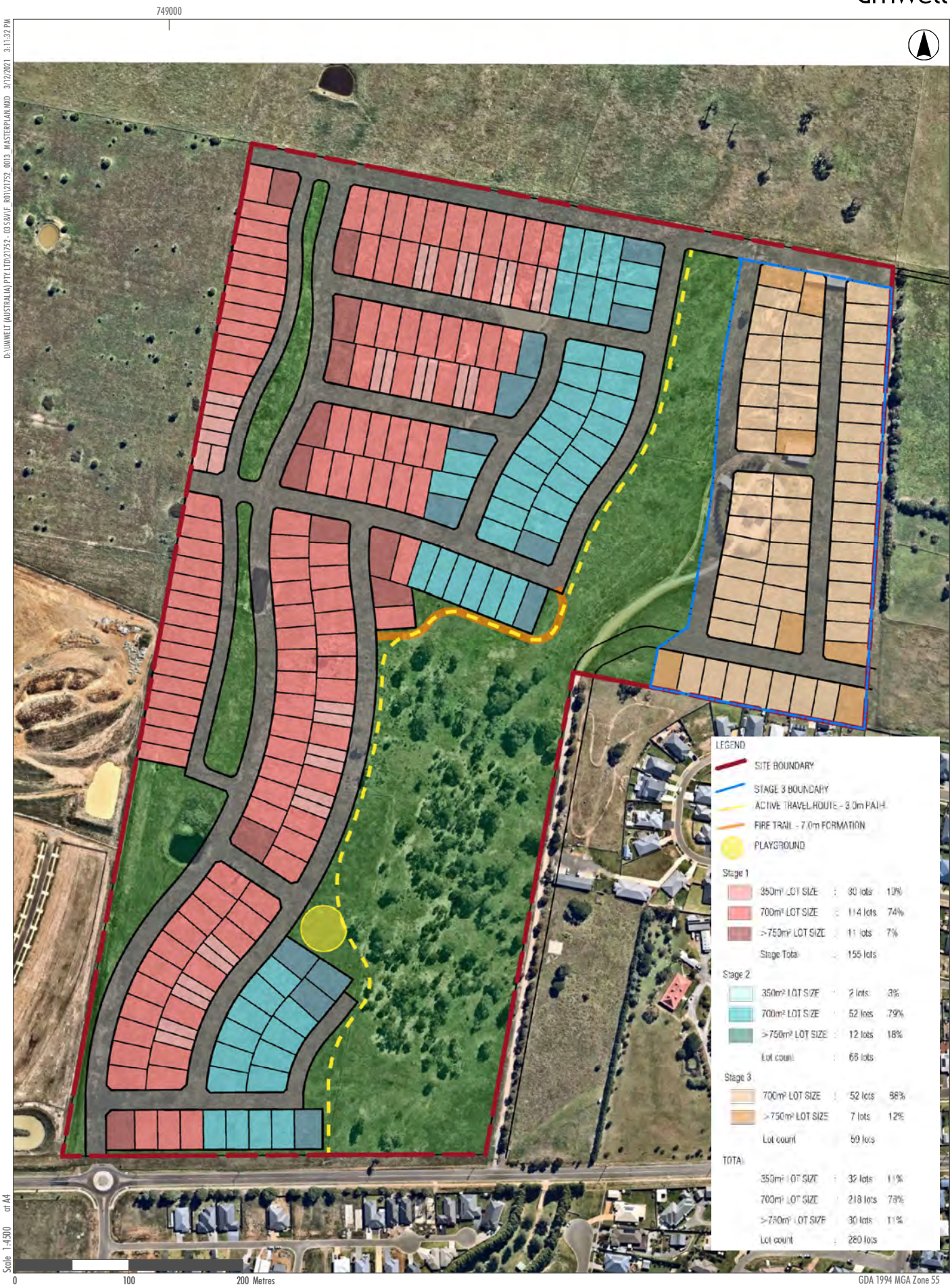


FIGURE 1-3
Masterplan

Data source: PlaceLogic (2021)

1.2 Description of Subject Land

For the purpose of this assessment, the total Development Footprint is approximately 31.96 ha in size and located on the northern extent of the Goulburn township. It is bounded by agricultural land to the north, by recently developed residential land to the east and south, and by current developing residential land to the west (**Figure 1.2**).

The site has been extensively cleared and modified for agriculture, including pasture improvement for livestock grazing. A residential house and farm shed are currently present in the Project Area. Native vegetation is characterised by derived grassland and structural woodland comprising 10.65 ha in the Development Footprint. Importantly, impacts to the majority of the structural woodland and high condition derived native grassland have been minimised. **Table 1.1** provides site location details of the Development Footprint.

Table 1.1 Development Footprint Location in the Landscape

Development Footprint Location in the Landscape	
IBRA Bioregion	South-eastern Highlands
IBRA Subregion	Monaro
Mitchell Landscape	Rockley Plains
LGA	Goulburn Mulwaree
Project Area Size	41.08 ha
Total Development Footprint Size	31.96 ha
Assessment Type	Site-based
Lot and DP	Lot 1/DP920161, Lot 1/DP1225759, Lot 1/DP981909
Current Land Use	Agriculture

1.3 Information Sources

Information sources used in the preparation of this BDAR included relevant government databases, regional mapping, and previous surveys and reports.

Relevant database searches completed were:

- BioNet Atlas of NSW Wildlife for records of threatened species and TECs (searched on 3 November 2021)
- Commonwealth DAWE Protected Matters Search Tool (searched on 3 November 2021)
- Vegetation Information System (VIS) Classification Database (OEH, 2019c)
- BAM Calculator (BAM-C) (App last updated: 22/10/2020 11:00 (Version: 1.3.0.00) BAM data last updated: 10/0262021 (Version: 45))
- Threatened Biodiversity Data Collection (TBDC) (DPIE, 2019d)
- Atlas of Groundwater Dependent Ecosystems (GDE) (BOM, 2019).

Relevant regional mapping reviewed were:

- Native vegetation of southeast NSW: SouthCoast_SCVIV_v14_E_2230 (Tozer et al. 2010)
- Biodiversity Values Map and Threshold Tool
- Sharing and Enabling Environmental Data (SEED) datasets and map
- NSW Threatened Species Scientific Committee website for preliminary determinations to species and ecological communities as threatened under the BC Act
- Soil Landscapes of the Goulburn 1:250,000 Sheet, (Hird, 1991).

Previous surveys and reports reviewed during this assessment were:

- NGH Environmental (2015) Flora and fauna technical report for residential subdivision, Goulburn. Prepared for Opus International Consultants (Australia) Pty Ltd
- NGH Environmental (2017) Flora and Fauna Assessment, Residential subdivision, Goulburn, Maxiwealth Group
- Capital Ecology (2018) 129 Marys Mount Road PCT Mapping and BAM Vegetation Integrity Survey (data only), Goulburn, Prepared for Maxiwealth Group.

The annual Final Priority Assessment List of nominated species and ecological communities was also reviewed for any that have been approved for assessment by the Minister responsible for the EPBC Act.

A review of results from previous Flora and Fauna Assessment and BioBanking calculations completed in accordance with BioBanking Assessment Method (BBAM) (NGH Environmental, 2015; 2017) was undertaken to inform the preparation of this BDAR. The BBAM was superseded by the BAM in 2016 and requires a re-assessment of biodiversity values using vegetation integrity plots in accordance with BAM. However, some information, including the determination of White Box Yellow Box Blakely's Red Gum Woodland listed under the BC Act and EPBC Act, remain viable and can be used to support the BDAR.

Vegetation mapping and data from vegetation integrity plots completed in accordance with the BAM by Capital Ecology (BAAS17089) in December 2018 (Capital Ecology, 2018) was reviewed and integrated into this BDAR following field verification.

1.4 Legislative Context and Planning Pathway

The proposed development requires development consent under Part 4 of the EP&A Act. The proposed development was lodged and approved by Goulburn Mulwaree Council subject to certain conditions, specifically with the preparation of a BDAR. The BDAR needs to address impacts on biodiversity in accordance with the requirements of the BAM as required in the BC Act, including an assessment of serious and irreversible impacts (SAII) on relevant biodiversity values. As outlined in Section 7.16 of the BC Act, the consent authority must refuse to grant consent under Part 4 of the EP&A Act if it is in the opinion that the proposed development is likely to have serious and irreversible impacts.

The Biodiversity Values Map and Threshold (BMAT) tool was used to confirm if the project would exceed the Biodiversity Offsets Scheme Threshold. Under the BC Act, for areas where minimum lot sizes are less than one hectare (i.e., the Development Footprint), any impacts to more than 0.25 ha of native vegetation on the site will exceed the native vegetation clearance threshold as outlined in clause 7.2 of the *Biodiversity Conservation Regulation 2017* (BC Regulation). The applicable minimum lot size is 0.07 ha, and the site has more than 0.25 ha of native vegetation within the Development Footprint and therefore an assessment in accordance with the BAM is required. The project also exceeds the area limits for the application of a streamlined assessment as outlined in Appendix 2 of the BAM.

The Commonwealth Department of Agriculture, Water and Environment (DAWE) (formerly Department of Environment and Energy) advised in 2017 that the proposed action is a controlled action under Section 75 of the EPBC Act. This decision was based on a greater impact area submitted in a referral indicating that the proposed action is likely to have a significant impact on the following matters of national environmental significance (MNES):

- White Box- Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (critically endangered)
- Superb Parrot (*Polytelis swainsonii*) (vulnerable).

Further information is required for the assessment of those impacts in a separate document (Preliminary Documentation Report) to be submitted to the Commonwealth following confirmation of the development footprint and offset strategy.

1.5 Report Preparation

The preparation of this BDAR was undertaken by appropriately qualified and experienced ecologists and BAM Assessors. This BDAR has been prepared by Natasha Crook and Jonathan Carr, a person accredited under Section 6.10 of the BC Act as a Biodiversity Assessment Method Assessor and reviewed and approved by David Moore. Personnel involved in the survey, data analysis and reporting are outlined in **Table 1.2**.

Table 1.2 Personnel and Their Role on This Project

Name	Qualifications	Assessor ID	Role
David Moore	MEnvMgtDev BSc (Hons)	BAAS18066	Project Director and Principal Ecologist – Technical Review
Natasha Crook	MEnvMgtDev BSc (Hons) DipSpatInfServ	BAAS18043	Project Management and Report Author – Ecological Survey, GIS analysis, BAM Calculator, BDAR Preparation
Jonathan Carr	BEnvScMgt	BAAS18009	Ecological Survey, BAM Plot, BAM Calculator, BDAR Preparation

2.0 Methods

The methods executed in this BDAR were undertaken in accordance with the BAM (DPIE, 2020a), and the Biodiversity Assessment Method Operational Manual (Stages 1 and 2) (OEH 2018a; DPIE 2019a).

2.1 Background Literature and Database Review

A review of previous reports, databases, and spatial data relevant to biodiversity values associated with the study area was undertaken (**Section 1.3**). The background review identified biodiversity values in the existing environment within a 10 km search area and the broader relevant IBRA subregions. The BAM Calculator was also used in conjunction with the review of information. The review informed survey design and was used to prepare a list of threatened species, threatened ecological communities (TECs) and important habitats for both threatened species and migratory species, and assess their likelihood of occurrence in the study area.

2.2 Landscape Features

Landscape features such as IBRA bioregions, IBRA subregions, and native vegetation extent within a 1500 m buffer area, cleared areas, rivers, streams, wetlands, and connectivity features were identified within the Project Area in accordance with Section 3 of the BAM (DPIE, 2020) and were sourced and/or derived from spatial information. Determining the 'Site Context' of the Development Footprint is calculated by assessing the native vegetation cover and patch size within the Development Footprint in accordance with Section 3.2 and Subsection 4.3.2 of the BAM, respectively (DPIE, 2020).

Native vegetation cover and the extent of cleared lands within the 1500 m buffer was determined through desktop assessment of existing mapping and aerial imagery, followed by rapid assessment of grassland areas from roadsides (DPIE, 2020a). A rapid roadside assessment (predominately along Middle Arm Road and Crookwell Road) focussed on native groundcover. Due to access restrictions, the extent of native ground-cover vegetation within areas (i.e., where a canopy of native species is absent) has mostly been estimated based on the visual interpretation of aerial imagery taking into account areas of cultivation and fenced boundaries. Mapping is broad-scale and does not represent a detailed site-specific mapping of native vegetation cover in the landscape and should not be used for any purpose other than the estimation of native vegetation cover under the BAM (DPIE, 2020a).

2.3 Native Vegetation

2.3.1 Vegetation stratification, mapping, and site interpretation

Preliminary mapping of native vegetation was completed in accordance with the BAM by Capital Ecology in December 2018 (Capital Ecology, 2018). Preliminary vegetation mapping was reviewed and updated to ensure consistency with best-practice techniques to delineate Plant Community Types (PCTs) across the Project Area. Review of vegetation mapping involved the following key steps:

- review of digital airborne imagery to explore vegetation distribution patterns as dictated by a change in canopy texture, tone, and colour, as well as topography
- review of the regional vegetation mapping sourced from Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands – SouthCoast_SCIVI_v14 (Tozer et al. 2010)
- predicting the distribution of particular vegetation communities based on the previous mapping undertaken in the Project Area (NGH, 2017)

- ground-truthing of the vegetation map based on survey effort and the previous mapping
- revision of vegetation community floristic delineations based on plot data
- revision of the vegetation map based on ground-truthing.

On-site vegetation mapping in the Project Area was mapped using site survey data and polygons digitised in a GIS (ArcGIS 10.3) at a scale of between 1:1,000 and 1:5,000 and not greater than 1:10,000. Coordinates of vegetation zone boundaries were recorded during site assessment with a GPS device. Mapping was undertaken with reference to aerial imagery and field data using ESRI ArcMap 10.3.

2.3.2 Floristic and Vegetation Integrity Survey

Vegetation Integrity Survey plots were completed in accordance with the BAM by Capital Ecology in 2018 (Capital Ecology, 2018). Field verification of previous floristic and vegetation integrity survey plot data was undertaken throughout the Project Area on 22 November 2019, 4 December 2019, and 4 February 2020.

Twelve floristic plots/transects were completed by Capital Ecology and three additional vegetation integrity plots were completed by Umwelt ecologists following revisions of the vegetation mapping and the development footprint. To address changes in the Development Footprint, one additional survey plot was completed on 12 December 2019 and two additional survey plots were completed on 4 February 2021. Eleven vegetation integrity plots were completed in native vegetation and four plots were conducted in exotic vegetation to meet the minimum survey requirements.

Vegetation survey effort of vegetation zones was adequately sampled and met with the minimum survey requirements under the BAM (DPIE, 2020a) as shown in **Table 2.1**. All plots used for vegetation integrity assessment were located within the Development Footprint, and plots completed outside the Development Footprint were excluded. Where the same vegetation zone occurred in separate stages, the same vegetation integrity data was used. This information assisted in the identification of plant community types and assessment of native vegetation integrity. Descriptions of vegetation zones are outlined in **Section 3.0**. A flora species list and full description of composition, structure and function attribute data are provided in **Appendix A**.

Reference was made to the VIS Classification Database to identify the PCT, as well as reviews of other regional and local vegetation mapping and reporting when verifying previous data and implementing field surveys. The PCT was stratified into broad condition states of the site to determine the appropriate number of transect/plots required in accordance with the BAM (DPIE, 2020a).

Figure 2.1 shows the locations of the vegetation integrity plots used in this assessment.

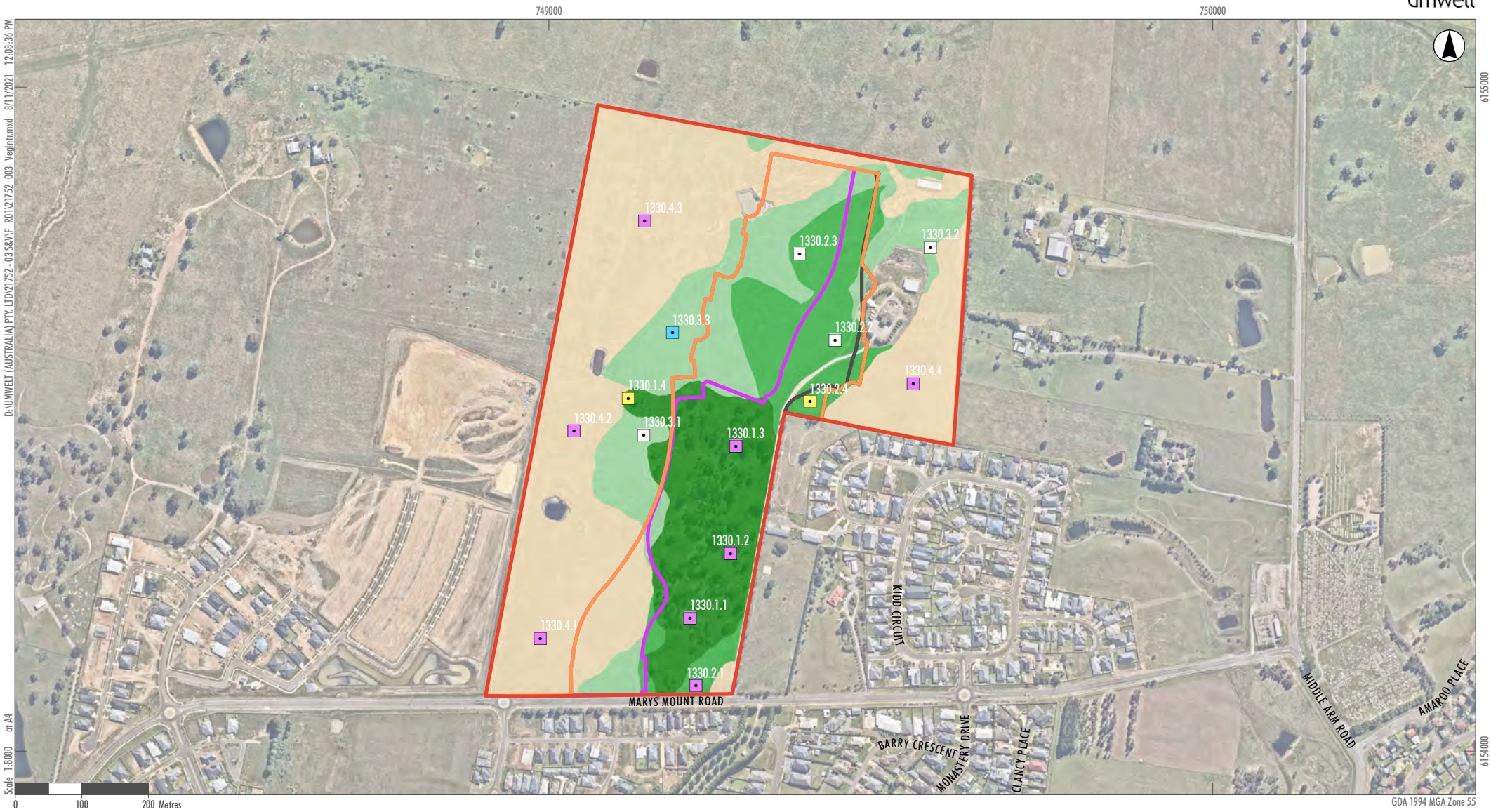
Table 2.1 Adequacy of Vegetation Integrity Assessment in the Project Area and Development Footprint

Vegetation Zone	PCT ID and Name	Broad Condition Class	Project Area (ha)*	Development Footprint area (ha)	No. of plots in total Development Footprint		No. of plots outside of the total Development Footprint	No. of plots completed in Project Area
					Required	Completed		
1	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-eastern Highlands Bioregion	Moderate/High (Native Woodland)	6.46	Stage 1 - 0.47	1	1	3	4
				Stage 2 – 0.24				
				Stage 3 – 0.00				
2		Moderate/High (Native Derived Grassland	5.15	Stage 1 – 0.24	1	2	2	4
				Stage 2 – 2.12				
				Stage 3 – 0.32				
3		Low (Native Derived Grassland)	7.68	Stage 1 - 4.44	2	3	0	3
				Stage 2 - 2.79				
				Stage 3 – 0.03				
4		Low Exotic (Derived Grassland)	19.93	Stage 1 -17.75	-	4	0	4
				Stage 2 – 2.02				
				Stage 3 – 0.004				
		TOTAL	**39.21**	**31.96**	**4**	**10**	**5**	**15**

** Area numbers rounded to two decimal places.*

The plot-based vegetation integrity survey was completed in accordance with BAM guidelines (DPIE, 2020a). Each plot consisted of a 20 x 50 m area used to measure the functional attributes, with a 20 x 20 m nested plot measuring floristic diversity (species composition and structure) and abundance. Composition, structure, and function attributes were ranked against benchmark data for the relevant PCT and a vegetation integrity score for each vegetation zone was determined in accordance with Sections 4.3 and 4.4 of the BAM. Plots were established to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone. Plots were positioned to avoid locations on ecotones, tracks (their edges) and/or small disturbed areas generally inconsistent with the target vegetation zone (e.g., small patches of bare ground). The location of each plot was recorded using a hand-held GPS with an accuracy of ± 5 m. The Map Grid of Australia (MGA) coordinate system was used.

At each plot, roughly 45 to 60 minutes was spent searching for all vascular flora species present within the 20 x 20 m floristic plot. Searches were generally undertaken through parallel transects from one side of the plot to another. Most efforts were spent examining the groundcover, which consistently supported well over half of the species present. An effort was made to search the tree canopy and tree trunks for mistletoes, vines, and epiphytes where present.



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Vegetation Integrity Plots Used in BAM-C (Captial Ecology 2019)
- Vegetation Integrity Plots Not Used in BAM-C (Capital Ecology 2019)
- Vegetation Integrity Plot Used in BAM-C (Umwelt 2020)
- Vegetation Integrity Plots Used in BAM-C (Umwelt 2021)

Vegetation Zones

- Zone 1 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 2 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 3 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Exotic Vegetation

FIGURE 2-1

Vegetation Integrity and Survey Effort

Image Source: Nearmap (2021) Data source: Capital Ecology (2019); Umwelt (2021); DevCore (2021); NSW DSFI (2021)

2.3.3 Plant Community Type (PCT) Allocation

The vegetation communities described within the Project Area were aligned with an equivalent PCT as detailed in the VIS Classification Database (OEH, 2019c). For each PCT described in the Development Footprint, the dominant and characteristic species were entered into the online plant community identification tab and an initial list of PCTs was generated. The profiles for each of the possible PCT were then interrogated and the most appropriate match was assigned based on floristic, structure, soil, landform, and distribution details.

Further detail regarding this allocation for the individual PCTs is outlined in **Section 3.3**.

2.3.4 Meandering Transects

Meandering transects were undertaken through vegetation units across the Project Area, particularly for the delineation and refinement of vegetation mapping and searching for threatened and otherwise significant species, endangered populations and TECs. Meandering transects enabled floristic sampling across a much larger area than systematic plots, allowing the survey to achieve a combination of detailed observation and broader appreciation. Records along transects supplemented floristic sampling carried out as part of the plot survey, however, the data collected was in the form of presence records. Meandering transects provided information on spatial patterns of vegetation that informed vegetation community mapping of the Development Footprint including the extent of areas supporting greater than 50% of native perennial cover.

2.3.5 VIS Benchmarks

This BAM assessment used the standard benchmarks provided in the VIS database and BAM-C. The assessment did not utilise any scaled benchmarks (i.e., drought benchmarks) or More Appropriate Local Data (MALD).

2.3.6 Threatened Ecological Community Delineation Techniques

PCTs identified in the Project Area were compared to TECs listed under the Commonwealth EPBC Act and NSW BC Act and an assessment of similarity with the NSW Scientific Committee Final Determinations and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic quadrat assessment, rapid assessments, and meandering survey to determine the floristic composition and structure of each ecological community
- comparison with published species lists, including lists of 'important species' as identified on the listing advice provided by the NSW Scientific Committee and/or Commonwealth Threatened Species Scientific Committee
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by the Commonwealth DAWE and the NSW BCD
- comparison with other assessments of TECs in the region.

2.4 Threatened Species

A preliminary assessment using the Threatened Biodiversity Data Collection (TBDC) available on BioNet (OEH, 2019a) was undertaken to generate a list of species-credit species that might require surveys and the suitable survey periods for each species. The results of these database searches, literature review and TBDC review were used to design the appropriate survey requirements for species-credit species.

2.4.1 Ecosystem Credit Species

Ecosystem-credit species are those threatened species that can be predicted by vegetation surrogates and landscape features. Ecosystem-credit species are not required to be specifically targeted during field surveys, however, an assessment of the suitability of habitat in the Development Footprint is undertaken to determine the species presence or otherwise in the vegetation zones identified. A list of the ecosystem-credit species was generated based on those predicted to occur by the BAM-C and a literature review considering additional species, habitat requirements and the level of habitat degradation. Targeted survey is not required for these species unless specific habitat types for the species are also listed in the candidate species-credit species list.

2.4.2 Species-Credit Species

2.4.2.1 Identification of candidate species-credit species

A list of candidate species-credit species was generated using the outputs from the BAM-C following the criteria outlined in Section 5.2 of the BAM.

Candidate species-credit species were confirmed to require surveys based on the presence of associated vegetation and suitable habitat features. Habitat condition was also considered. Additional threatened species produced from database searches (i.e., BioNet and the Protected Matters Search Tool) were either removed or included based on suitable habitat in the Project Area.

2.4.2.2 Candidate Species Credit Species Surveys

Flora

The following species-credit species were targeted in areas of suitable habitat using walked transects and other methods outlined in **Table 2.2**:

- Aromatic Peppercress (*Lepidium hyssopifolium*)
- Tarengo Leek Orchid (*Prasophyllum petilum*)
- Button Wrinklewort (*Rutidosis leptorrhynchoides*)
- Hoary Sunray (*Leucochrysum albicans* var *tricolor*)
- Small Purple-pea (*Swainsona recta*)
- Silky Swainson-pea (*Swainsona sericea*)
- Austral Toadflax (*Thesium australe*).

Hoary Sunray (*Leucochrysum albicans* var *tricolor*) is not listed under the BC Act however, it is included into the BAM-C Calculator due to its status as Endangered under the EPBC Act and is considered as a species-credit species.

One species credit species, Paddys River Box (*Eucalyptus macarthurii*) was included as a candidate species following an update in the BAM-C. Mature and regenerating trees in the development footprint were identified to species level during HBT assessments during 2019, and no rough barked trees were present providing adequate survey confidence for this species.

The 2019 targeted threatened flora surveys were guided by the methodology and effort described in the NSW Guide to Surveying Threatened Plants (OEH, 2016) and the Draft Survey Guidelines for Australia's Threatened Orchids (DoE, 2013). At the time of writing the BDAR, the S*urveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020b) was released after completion of surveys. Targeted flora surveys completed in 2019 are consistent with these guidelines. Although prevailing dry environmental conditions have been evident, resulting in less-than-optimal survey conditions during the field survey, repeated visits have been made to the Project Area since 2015 by various consultants.

Walked transects were generally between 10-50 m depending on the habitat condition. Survey tracks completed by Umwelt on 22 November and 4 December 2019 are mapped in **Figure 2.2**. Locations of habitat assessments and meander traverses completed by Capital Ecology (2018) were not available and are not shown. Field survey locations and efforts from NGH Environmental (2015-2016) surveys can be found in the Flora and Fauna Assessment report (NGH, 2017). A combination of all survey efforts since 2015 was used to meet appropriate survey guidelines and is described in **Table 2.2**.

Table 2.2 Flora species credit species survey methodology and timing

Species Targeted	Survey Date	Required Survey Period	Effort guideline (distance/time)*	Method	Survey effort (distance/time)
Lepidium hyssopifolium	22 November 2019 and 4 December 2019 (Umwelt) 11 December 2018 (Capital Ecology) November 2015, March 2016, and October 2016 (NGH Environmental)	October-December	20 km/ 5 hours	Random meanders and parallel threatened flora transect throughout mapped native vegetation (transects ~10 m in open vegetation across ~20 ha of suitable habitat) Searches during floristic plot assessments	7.5 km/24 person hours in November and December 2019 by Umwelt (**Figure 2.2**) 16 person hours in December 2018 (Capital Ecology) (note route not available) ~8 km/28 person hours in 2015-2016 (NGH Environmental) (survey route not provided)
Prasophyllum petilum		September-December			
Rutidosis leptorrhynchoides		January-December			
Swainsona recta *Swainsona sericea*		September-November			
Leucochrysum albicans var *tricolor*		September-April			
Thesium australe		November-February			

Species Targeted	Survey Date	Required Survey Period	Effort guideline (distance/time)*	Method	Survey effort (distance/time)
Eucalyptus macarthurii	22 November 2019 and 4 December 2019 (Umwelt)	All year	0.25 km / 10 minutes	All trees in development footprint inspected and identified in conjunction with HBT surveys.	All mature and regenerating trees in development footprint identified in November and December 2019 by Umwelt (survey route not provided).
Total flora survey effort					**15.5 km/ 68 person hours**

Fauna

The following species-credit species were targeted in areas of suitable habitat using methods outlined in **Table 2.3**.

- Superb Parrot (*Polytelis swainsonii*)
- Little Eagle (*Hieraaetus morphnoides*)
- Striped-legless Lizard (*Delma impar*)
- Golden Sun Moth (*Synemon plana*).

Based on habitat requirements and site context (i.e., the absence of suitable habitat features) the following species-credit species were discounted from consideration and targeted surveys were not required (**Table 3.12**):

- Regent Honeyeater (*Anthochaera phrygia*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- Swift Parrot (*Lathamus discolor*)
- White-bellied Sea Eagle (*Haliaeetus leucogaster*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Southern Myotis (*Myotis macropus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Pink-tailed Worm-lizard (*Aprasia parapulchella*).

Where meeting appropriate guidelines, survey effort from NGH Environmental (2015, 2017) and Capital Ecology (2018) was included in the threatened fauna survey effort.

Capital Ecology (2018) conducted Superb Parrot breeding season surveys of the Project Area and broader locality to assess the habitat value of remnant woodland and determine whether the species is likely to nest and forage. The surveys were completed in accordance with the Commonwealth survey guidelines (DEWHA, 2010a). Other bird species observed were also recorded.

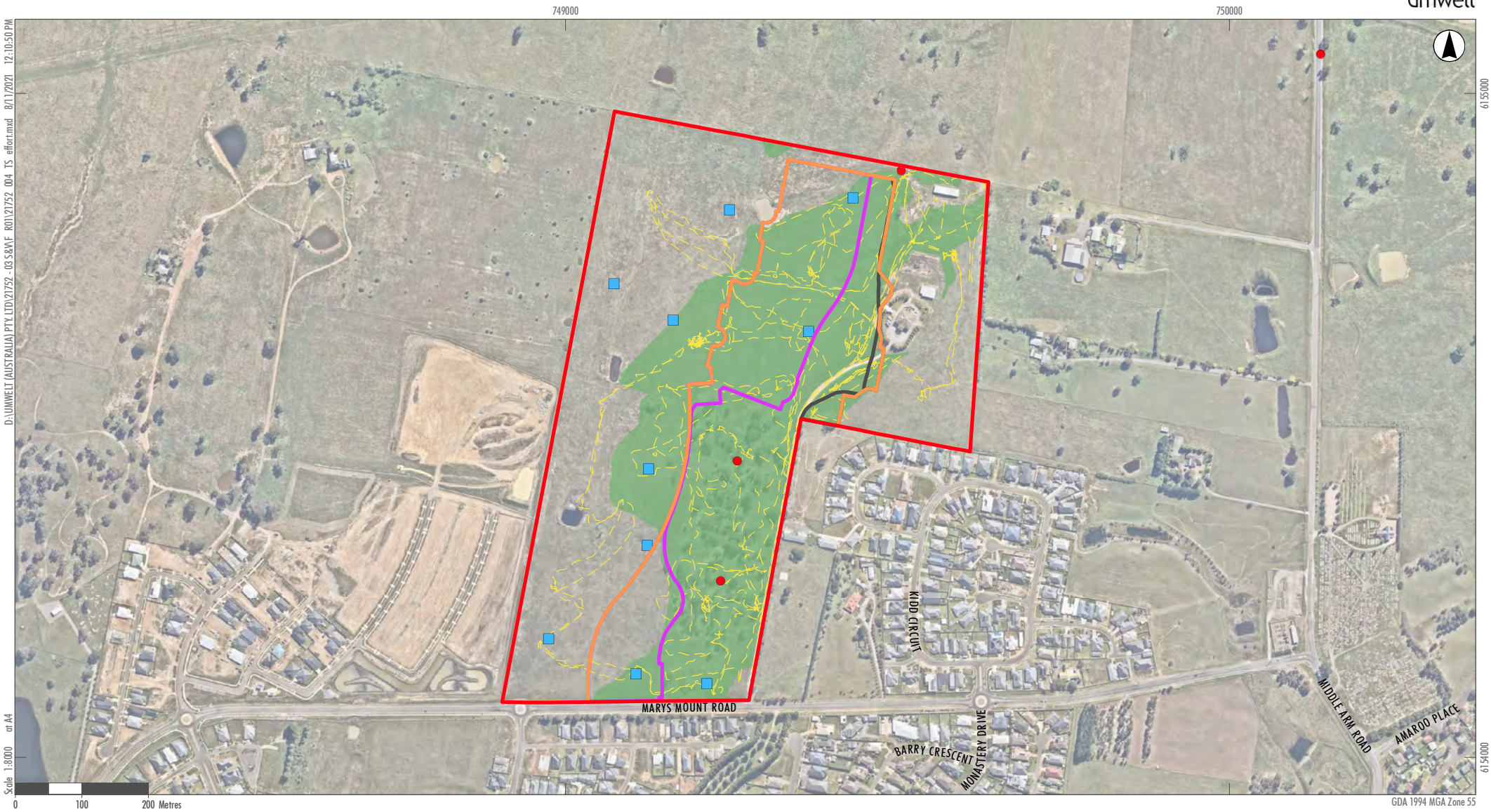
Umwelt completed an inspection of all hollow-bearing trees within the Project Area.

Although no targeted survey is required for threatened microbats due to the lack of suitable habitat, NGH Environmental (2017) conducted six hours of Anabat bat detector recording at locations in the Project Area in February March 2016.

Field survey locations and efforts are illustrated in **Figure 2.2** and the Flora and Fauna Assessment (NGH, 2017). Only Superb Parrot survey locations within the Project Area are mapped.

Table 2.3 Fauna species credit species survey methodology and timing

Species Targeted	Survey Date	Required Survey Period	Method	Survey Effort
Superb Parrot	November 2015, February/March 2016, and October 2016 (NGH Environmental) 11 December 2018 (Capital Ecology) 22 November 2019 and 4 December	September-November	Opportunistic observation throughout the survey period NGH Environmental, 2017: • Diurnal bird survey • Stag watch	A total of ~15.5km over ~68 person-hours was walked for all opportunistic surveys across the whole Project Area 3.5 hours of dedicated search time for diurnal birds (NGH Environmental: February-March 2016) 6 hours of spotlighting at 16 hollow-bearing trees and 6 hours stag watch time at 6 hollow-bearing trees (February-March 2016) 12 hours over four days (7am-10am) targeted Superb Parrot survey (Capital Ecology) in the Project and broader locality (**Figure 2.2**).
Little Eagle White-bellied Sea Eagle	November 2015, February/March 2016, and October 2016 (NGH Environmental) 11 December 2018 (Capital Ecology) 22 November 2019 and 4 December	January-December Little Eagle - August – October (breeding habitat survey) White-bellied Sea Eagle - July – December (breeding habitat survey)		
Striped Legless Lizard	October-December 2016 (NGH Environmental, 2017	September-December	The artificial shelter methodology (direct correspondence was made with OEH Threatened Species Officer (Rod Pietsch)) (NGH Environmental, 2017)	10 tile grids (or arrays) were installed in a grid pattern across the site. Each array consisted of 50 roof tiles placed in a grid pattern of 5 x 10 tiles, with each tile placed approximately 5 m apart. The entire survey, therefore, contained a total of 500 tiles across the site Checks were then conducted generally weekly from 7 October through to 15 December 2016 (for a total of ten checks over 11 weeks). (NGH Environmental, 2017) (survey route not provided)
Golden Sun Moth	November 2015, February/March, and October 2016 (NGH Environmental) 11 December 2018 (Capital Ecology) 22 November 2019 and 4 December	October-December	Meandering transects surveys. Opportunistic observation throughout survey periods	Meandering traverses were undertaken at the same time as targeted flora surveys and followed the same search area. Surveys were conducted on two days day in November and December 2019, however, only one day had suitable conditions for moth detection. Survey effort also included previous walked transects in 2015, 2016 and 2018. 5 km searched over 68 person hours



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Native Vegetation
- Threatened Flora Survey Tracks (Umwelt 2019)
- Striped Legless Lizard tile array survey locations (NGH Environmental 2016)
- Superb Parrot survey locations (Capital Ecology 2018)

FIGURE 2-2

Threatened Species and Survey Effort

Image Source: Nearmap (2021) Data source: Capital Ecology (2019); Umwelt (2019); DevCore (2021); NSW DSFI (2021); NGH Environmental (2016)

2.5 Candidate Features for Additional Prescribed Impacts

2.5.1 Identifying prescribed additional biodiversity impacts

A desktop assessment and literature review were undertaken to identify potential locations with prescribed impacts. This included aerial imagery interpretation for rocky habitats, man-made structures, non-native vegetation, movement corridors, waterbodies, catchment and drainage regimes and roads.

A site inspection and assessment by Umwelt Ecologists over 3 days (22/11/2019, 4/12/2020 and 4/02/2021) were undertaken to ground truth results from the desktop assessment. This includes a description and mapping of potential candidate features for prescribed impacts.

2.6 Weather Conditions

Weather conditions for all relevant surveys undertaken since 2016 are outlined in **Table 2.4**. Data were derived from Goulburn TAFE weather station (70263) from the Bureau of Meteorology (BOM) (2019). The surveys were primarily conducted during spring and summer. Extremely dry conditions were experienced during 2018 and 2019 surveys with a total annual rainfall of 485.2 mm recorded in 2018 and 481.4 mm recorded in 2019 compared to an average annual rainfall of 618.0 mm for the region (BOM, 2019). Conditions were considered ideal during surveys in November 2015 and 2016 for targeting both flora and fauna.

Table 2.4 Weather Conditions for Species-credit Surveys

Date	Daily Data			Monthly Data*		
	Min-Max Temp. (°C)	Rainfall (mm)	Relative Humidity (%)	Min-Max Temp (mean) (°C)	Rainfall (total) (mm)	Relative Humidity (mean) (%)
NGH Environmental						
29/02/16	14.8-24.5	0	-	14.2-28.5	13.6	-
1/03/16	17.2-29.6	0	-	13.3-26.5	30.6	-
7/10/16	9.6-22.0	0	-	6.4-17.8	47.2	-
13/10/16	3.8-14.2	0	-			-
29/10/16	9.5-21.6	0	-			-
4/11/16	10.3-22.7	0	-	10.2-24.1	33.0	-
11/11/16	10.8-25.5	0	-			-
17/11/16	-	0	-			-
25/11/16	7.5-22.9	0	-			-
2/12/16	11.3-29.0	0	-	14.4-28.2	63.0	-
8/12/16	12.5-31.0	0	-			-
15/12/16	12.5-14.3	14.6	-			-
Capital Ecology						
11/12/18	12.3-24.1	0.2	83	13.5-28.3	64.1	67
Umwelt						
22/11/19	?#-32.8	0	68	10.1-26.4	15.4	61
4/12/19	11.5-23.5	0	64	13.2-30.3	0.8	62
4/02/21	13.6-29.4	0	73	14-25	100	85

*Monthly data for February 2021 was recorded on the 23 February 2021.

No data was available for the minimum temperature from BOM

2.7 Limitations

The field survey aimed to sample the development footprint and a comprehensive inventory of species was not made. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year e.g., orchids or migratory birds and require specific weather conditions for optimum detection e.g., breeding, and flowering periods. The conclusions of this BDAR are therefore based upon available data and are indicative of the environmental condition of the development footprint at the time of the survey. Previous assessments by Capital Ecology (2018) and NGH Environmental (2015; 2016; 2017) of targeted threatened flora and fauna surveys were considered adequate for determining the presence of target species. Further assessment was undertaken to validate and address any limitations. It should be noted that not all survey locations completed by Capital Ecology and NGH Environmental were available to be illustrated in this BDAR, but instead described in **Section 2.0**.

Site conditions, including the presence of threatened species, can change with time. To address this limitation, the assessment has aimed to identify the presence and suitability of the habitat for threatened species.

3.0 Results

3.1 Landscape Features and Site Context

The Project Area is located in the South-eastern Highlands bioregion and the Monaro sub-region as defined by the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995). A summary of landscape descriptions is provided in **Table 3.1**. The landscape features are illustrated in **Figure 3.1** and **Figure 3.2**.

Table 3.1 Landscape Features

Landscape Features	
IBRA Bioregion	South-eastern Highlands
IBRA Subregion	Monaro
NSW Landscape	Rockley Plains (62% cleared)
Native Vegetation Cover	**Buffer area (1,500 m):** 2,076 ha **Native vegetation cover**: 90 ha **Landscape native vegetation cover**: 4.3% Percent native vegetation cover class: Relictual (with 10% or less native vegetation cover)
Strahler Streams	No waterways within the Development Footprint
Important and Local Wetlands	None identified
Areas of Geological Significance and Soil Hazard Features	No areas of geological significance or soil hazard features were identified. There are small rocky outcrops within the Development Footprint, which is heavily imbedded and low to the ground. These are associated with the Rhyanna Formation derived from siltsone and fine-grained sandstone, and the Forest Lodge Quartz derived from porphyritic quartz (Thomas et al, 2013). The Project Area is within the Monastrey Hill Soil Landscape unit, which comprises fine sandy loams and deeper structured orange clays and grey clays (Hird, 1991).
Areas of Outstanding Biodiversity Value	None identified
Connectivity Features	The proposed Development Footprint is not identified in any corridor mapping and does not form part of the local corridor that contributes significantly to the movement and viability of flora and fauna in the locality.

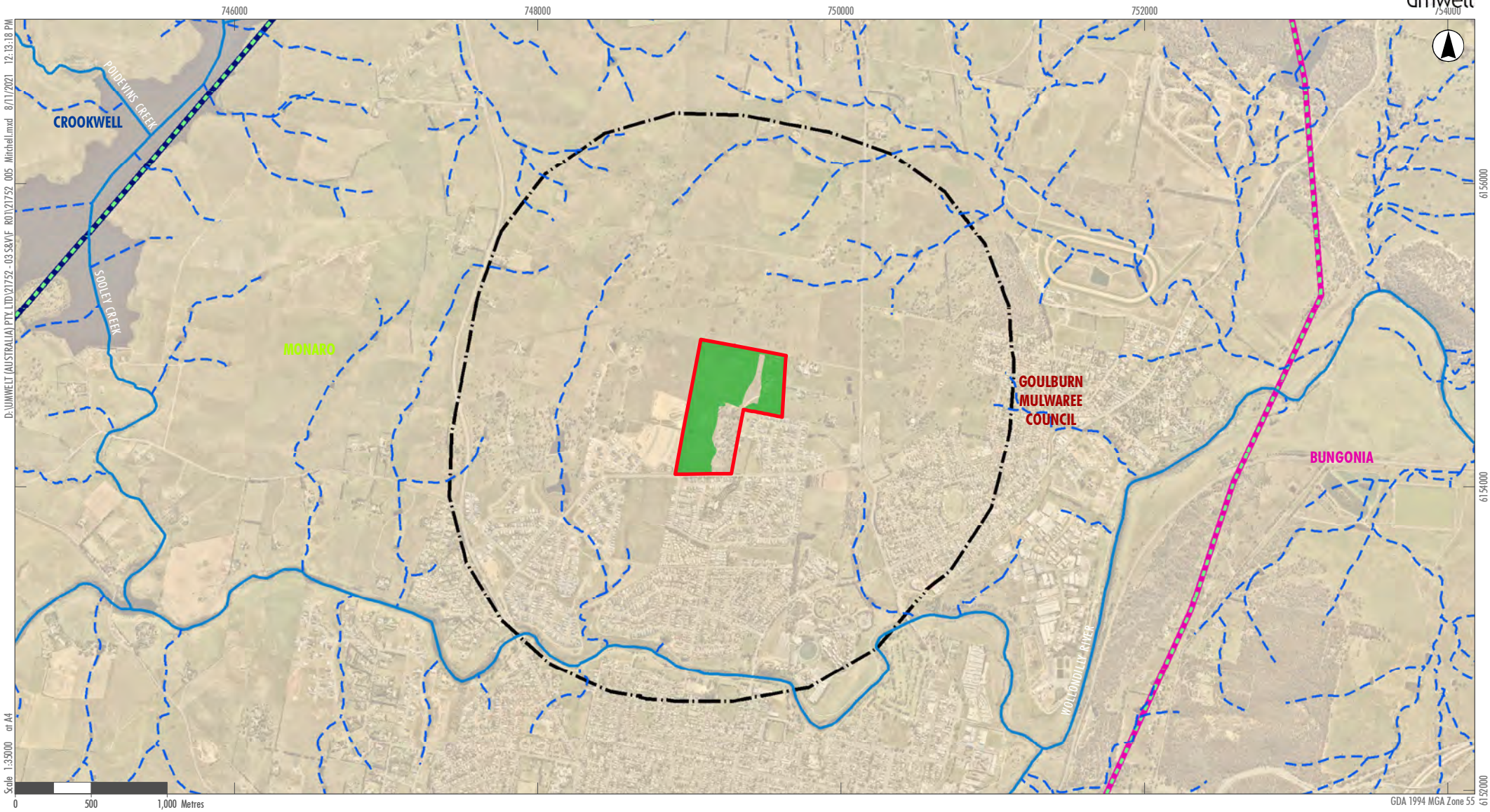
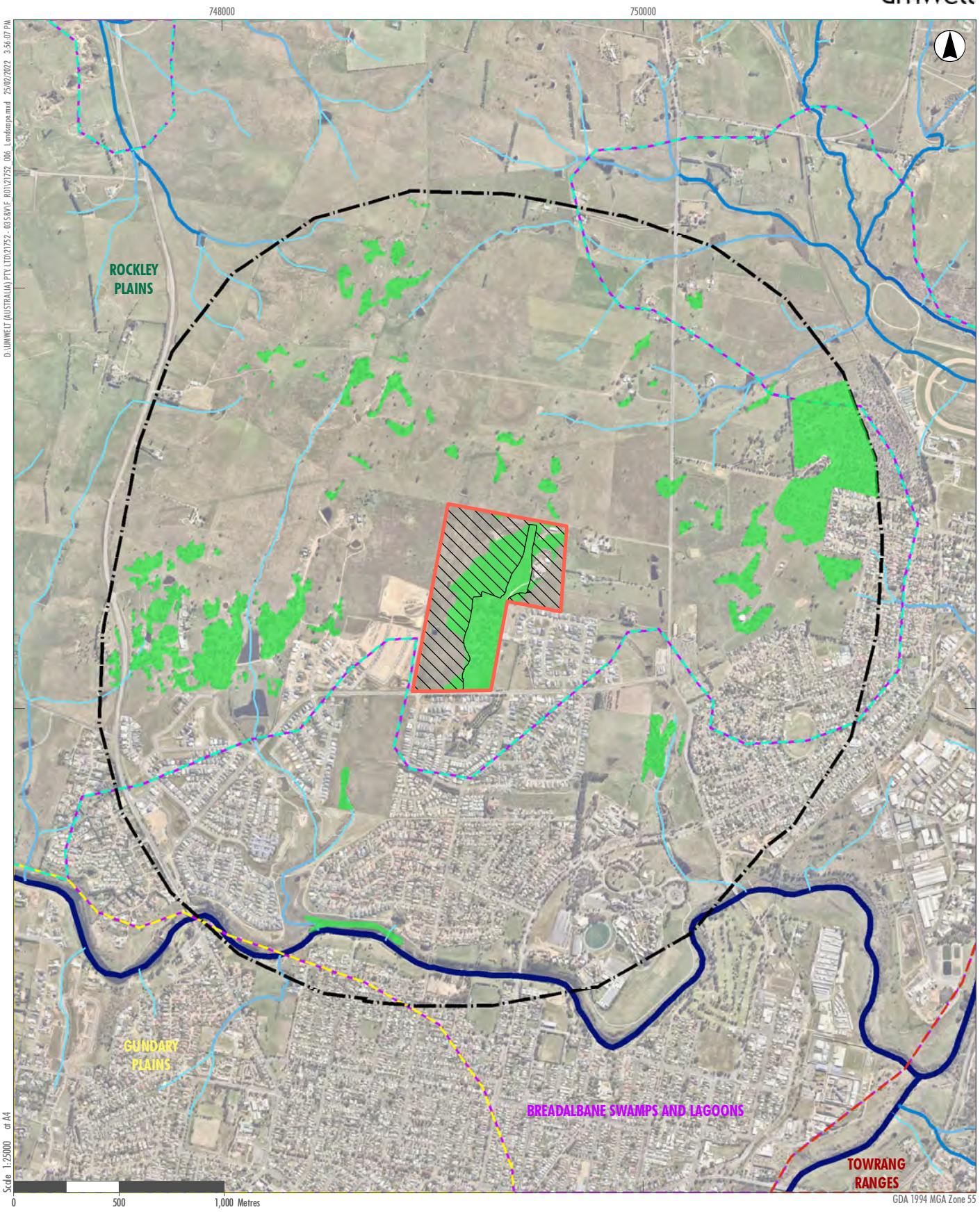


FIGURE 3-1

Local Government Area
IBRA Region / Subregion

Image Source: Nearmap (2021) Data source: Umwelt (2019); DevCore (2021); NSW DSFI (2021)



Legend

- Project Area
- Disturbance Footprint (All stages)
- Project Buffer 1500 m
- Native Vegetation Extent

Stream Order (Strahler)

- 1
- 2
- 3
- 4
- >5

Mitchell Landscape

- Breadalbane Swamps and Lagoons
- Gundary Plains
- Rockley Plains
- Towrang Ranges

FIGURE 3.2

Landscape Features

Image Source: Nearmap (2021) Data source: DevCore (2021); NSW DSFI (2021)

3.2 Native Vegetation

This BDAR describes PCTs in terms of their floristic composition, geological substrate, landscape position and relevant regional vegetation classification.

3.2.1 Vegetation and Plant Community Types in the Project Area

A total of 19.28 ha of native vegetation were identified within the Project Area, comprising of one native Plant Community Type (PCT), PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, in three condition classes (**Table 3.2**). A full description of PCT 1330 is presented in **Table 3.3**. Further descriptions of each vegetation zone and areas of exotic vegetation are provided in **Section 3.3**. A comprehensive list of the plant species recorded is provided in Appendix A and reflects the local variation of woodland and derived grassland communities at the site. The distribution of vegetation zones within the Project Area is illustrated in **Figure 3.3**.

A total of 19.93 ha of exotic vegetation occurs within the Project Area.

Table 3.2 PCTs and Vegetation Zones within the Project Area and Development Footprint

Vegetation Zone	PCT ID and Name	Condition Class	Patch Size	Plots	Project Area (ha)	Stage 1 - Development Footprint	Stage 2 - Development Footprint	Stage 3 – Development Footprint	Total Impact within Development Footprint
1	PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/High (Native Woodland)	5 - <25 ha	1330.1.1 1330.1.2 1330.1.3 1330.1.4	6.46	0.47	0.24	0.00	0.71
2		Moderate/High (Native Derived Grassland	5 - <25 ha	1330.2.1 1330.2.4 1330.2.2 1330.2.3	5.15	0.24	2.12	0.32	2.68
3		Low (Native Derived Grassland)	5 - <25 ha	1330.3.1 1330.3.3 1330.3.2	7.68	4.44	2.79	0.03	7.26
-	Exotic vegetation	Low (Exotic Derived Grassland)	NA	1330.4.1 1330.4.2 1330.4.4 1330.4.3	19.93	17.75	2.02	0.004	19.77
Total Native Vegetation					**19.28**	**5.15**	**5.14**	**0.35**	**10.65**
Non-vegetation (existing house footprint and farm dams)					**1.87**	**1.43**	**0.08**	**0.07**	**1.58**
Grand Total					**41.08**	**24.33**	**7.21**	**0.42**	**32.00**

Table 3.3 PCT 1330 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

<table>
<tr><th>PCT Name</th><th colspan="3">PCT 1330– Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion</th></tr>
<tr><td>Vegetation formation</td><td colspan="3">Grassy Woodlands</td></tr>
<tr><td>Vegetation Class</td><td colspan="3">Southern Tableland Grassy Woodlands</td></tr>
<tr><td>PCT Percent Cleared</td><td colspan="3">94%</td></tr>
<tr><td>Vegetation Description</td><td colspan="3">Woodland with a sparse shrub layer and dense grassy groundcover. Occurs on loamy soils on undulating terrain between 500 and 900 m on the tablelands.</td></tr>
<tr><td rowspan="6">PCT Allocation</td><td colspan="3">This vegetation is most likely to be representative of PCT 1330 for the following reasons:</td></tr>
<tr><td>Vegetation Zone 1</td><td>Vegetation Zone 2</td><td>Vegetation Zone 3</td></tr>
<tr><td>The vegetation has a woodland structure with a canopy characterised by Eucalyptus blakelyi, Eucalyptus melliodora, with a range of other eucalypts occurring occasionally or in small patches, including Eucalyptus pauciflora, Eucalyptus viminalis, and Eucalyptus mannifera.</td><td colspan="2">The vegetation has no canopy but is in proximity to Zone 1 and is likely to have once had characteristic tree species. There is no indication of different soil or terrain contexts which may have resulted in the dominance of other canopy species.</td></tr>
<tr><td colspan="2">The shrub layer is sparse with occasionally shrub species such as Cassinia aculeata and Lissanthe strigosa.</td><td>The shrub layer is sparse with occasionally shrub species such as Lissanthe strigosa.</td></tr>
<tr><td colspan="3">The groundcover is generally dense dominated by diagnostic native grasses and other forbs, including Bothriochloa macra, Lomandra filiformis subsp. coriacea, Microlaena stipoides, Themeda triandra and Goodenia hederacea.</td></tr>
<tr><td colspan="3">The landscape position matches undulating hills on loamy soils situated between 500-900 m AHD.</td></tr>
<tr><td colspan="3">PCT 1330 also shares affinities with PCT 1334 - Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South-eastern Highlands Bioregion. The vegetation assemblage represented in Development Footprint has characteristics of PCT 1334, particularly in floristics comprising Eucalyptus pauciflora in the canopy, and Austrostipa spp., Rytidosperma spp., and Chrysocephalum apiculatum present in the groundcover. However, PCT 1334 lacks dominating canopy species Eucalyptus blakelyi and Themeda triandra and other species Eucalyptus viminalis and is better represented by PCT 1330.</td></tr>
</table>

3.2.2 Vegetation Zone Descriptions

Vegetation zones are defined under the BAM as relatively homogenous areas of native vegetation that are the same PCT and same broad condition state. Native vegetation within the Project Area was classified as PCT 1330 as described in **Section 3.2** and then mapped into three vegetation zones, with distinct condition differences as a result of past disturbance and different land-use practices, as follows

- Vegetation Zone 1 (Moderate/High condition – native woodland), described in **Table 3.4**
- Vegetation Zone 2 (Moderate/High condition – native derived grassland), described in **Table 3.5**

- Vegetation Zone 3 (Low condition – native derived grassland), described in **Table 3.6**.

Description of vegetation zones in **Table 3.4** to **Table 3.6** was collated from all vegetation integrity plots in the Project Area.

Pasture improvements and other agricultural disturbances have created vegetation dominated by exotic vegetation which tends to dominate on deeper more fertile soils on lower slopes and valley flats. Vegetation integrity plots were completed in exotic vegetation to determine conditions but were not allocated a vegetation zone. Exotic vegetation is described in **Table 3.7**.

Table 3.4 Vegetation Zone 1 - PCT 1330 (Moderate/High Condition – Native Woodland)

Condition	Vegetation Zone 1 Moderate/High – Native Woodland	
Project Area	6.46 ha	
Development Footprint	Stage 1 - 0.47 ha	
	Stage 2 - 0.24 ha	
	Stage 3 – 0.00 ha	
Patch Size Class	5-<25ha	
BC Act Status	Vegetation Zone 1 is consistent for listing as critically endangered ecological community *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the BC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
EPBC Act Status	Vegetation Zone 1 is consistent for listing as critically endangered ecological community *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
General Description	Open grassy woodland area containing numerous large mature trees and regenerating trees dominated by *Eucalyptus blakelyi, Eucalyptus melliodora, and Eucalyptus viminalis*. It has a very sparse midstorey and predominately native ground layer dominated by perennial native grasses. This vegetation zone is distributed within the south-east of the Project Area on gentle sections of the mid-west facing slope.	
Canopy	This vegetation zone is characterised by an overstorey primarily comprising a combination of *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus pauciflora, Eucalyptus viminalis.*	
Midstorey	This vegetation zone has very sparse and scattered shrubs comprising *Cassinia aculeata* and *Lissanthe strigosa.*	
Ground Cover	This vegetation zone primarily comprises areas of exposed bare ground and leaf litter with large patches of native vegetation predominantly consisting of native grasses *Austrostipa bigeniculata, Austrostipa scabra, Themeda triandra.*	
Weeds	This vegetation zone has various patches of weeds mostly dominated by high threat weeds *Lycium ferocissimum, Nassella trichotoma, Rosa rubiginosa*.	
Average native groundcover (%)	22.4 (20.1-26.7)	
Average exotic groundcover (%)	7.1 (3.2-12.2)	

Table 3.5 Vegetation Zone 2 - PCT1330 (Moderate/High Condition – Native Derived Grassland)

Condition	Vegetation Zone 2 Moderate/High – Native Derived Grassland	
Project Area	5.15 ha	
Development Footprint	Stage 1 - 0.24 ha	
	Stage 2 - 2.12 ha	
	Stage 3 - 0.32 ha	
Patch Size Class	5-<25ha	
BC Act Status	Vegetation Zone 2 is consistent for listing as critically endangered ecological community *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the BC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
EPBC Act Status	Vegetation Zone 2 is consistent for listing as critically endangered ecological community *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
General Description	Derived native grassland containing zero trees and very sparse shrubs. It typically occurs on moderate to steep sections of the mid-upper slopes. Some parts of this vegetation zone occur on small isolated exposed rocky outcrops.	
Canopy	This vegetation zone lacks a canopy.	
Midstorey	This vegetation zone has very few native shrubs comprising *Cassinia aculeata* and *Lissanthe strigosa.*	
Ground Cover	This vegetation zone primarily comprises areas of native ground vegetation predominantly consisting of native grasses *Austrostipa bigeniculata, Austrostipa scabra, Themeda triandra, Bothriochloa macra* and native forbs *Lomandra filiformis* subsp. *coriacea* and *Chrysocephalum apiculatum.*	
Weeds	This vegetation zone has various patches of weeds including high threat weeds, *Hypericum perforatum* and *Nassella trichotoma*.	
Average native groundcover (%)	57.4 (52.3-62.8)	
Average exotic groundcover (%)	7.95 (1.1-18.8)	

Table 3.6 Vegetation Zone 3 - PCT1330 (Low Condition – Native Derived Grassland)

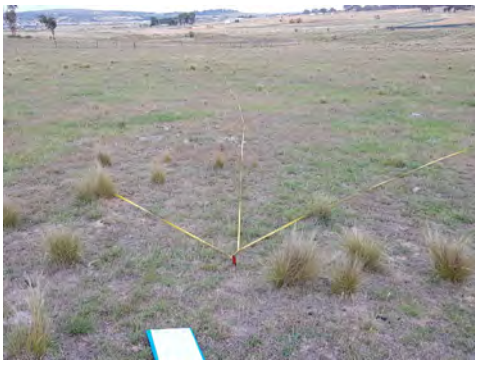
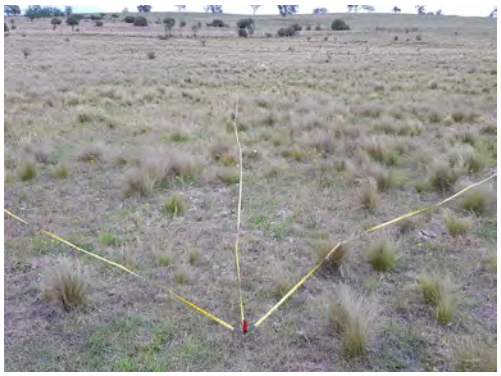
Condition	Vegetation Zone 3 Low - Native Derived Grassland	
Area	7.68 ha	
Development Footprint	Stage 1 - 4.44 ha	
	Stage 2 - 2.79 ha	
	Stage 3 - 0.03 ha	
Patch Size Class	5-<25ha	
BC Act Status	Vegetation Zone 3 is consistent for listing as critically endangered ecological community *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the BC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
EPBC Act Status	Although Vegetation Zone 3 didn't contain 12 or more native forbs in the ground layer, it is considered part of the same patch as Zone 1 and 2, where the same area is predominately native and consistent for listings under the EPBC Act. Assessment against the criteria and condition thresholds is present in **Section 3.3**.	
General Description	Derived native grassland containing zero trees and very sparse shrubs. It typically occurs on gentle to moderate sections of the lower-mid slopes.	
Canopy	This vegetation zone lacks a canopy.	
Midstorey	This vegetation zone has very few native shrubs comprising *Lissanthe strigosa.*	
Ground Cover	This vegetation zone primarily comprises areas of native ground vegetation predominantly consisting of native grasses *Themeda triandra*, *Bothriochloa macra* and occasional native forbs *Lomandra filiformis* subsp. *coriacea* and *Chrysocephalum apiculatum.*	
Weeds	This vegetation zone has various patches of weeds including high threat weeds, *Hypericum perforatum, Eragrostis curvula, Lycium ferocissimum, Nassella trichotomy* and *Paspalum dilatatum*.	
Average native groundcover (%)	64.5 (56.3-76)	
Average exotic groundcover (%)	10.5 (8.5-12.8)	

Table 3.7 Exotic Vegetation

Condition	Cleared / Exotic	
Project Area	19.93 ha	
Development Footprint	Stage 1 - 17.75 ha	
	Stage 2 - 2.02 ha	
	Stage 3 - 0.004 ha	
Patch Size Class	Not Applicable	
BC Act Status	Not applicable.	
EPBC Act Status	Not applicable.	
General Description	Exotic grassland containing no native trees and shrubs. It typically occurs flat to lower slopes on deeper soils that have been affected by past agricultural activities.	
Canopy	This vegetation zone lacks a canopy.	
Midstorey	This vegetation zone lacks a native midstorey.	
Ground Cover	This vegetation zone primarily comprises areas of exotic ground vegetation predominantly consisting of exotic grasses *Dactylis glomerata*, *Nassella trichotoma*, *Nassella neesiana,* and a range of exotic forbs.	
Weeds	This vegetation zone has various patches of weeds including high threat weeds, *Hypericum perforatum, Lycium ferocissimum, Nassella neesiana* and *Paspalum dilatatum*	
Average native groundcover (%)	6.0 (3-11.5)	
Average exotic groundcover (%)	70.25 (62.6-73.5)	

Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Vegetation Integrity Plot (Umwelt 2020)
- Vegetation Integrity Plots (Umwelt 2021)
- Vegetation Integrity Plots (Captial Ecology 2019)

Vegetation Zones

- Zone 1 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 2 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 3 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Exotic Vegetation

FIGURE 3-3

Vegetation Zones in the Project Area

Image Source: Nearmap (2021) Data source: Capital Ecology (2019); Umwelt (2019); DevCore (2021); NSW DSFI (2021)

3.2.3 Vegetation Integrity Score

Vegetation integrity data from ten (10) plots completed were entered into the BAM -C to determine the integrity score for each vegetation zone. The raw plot data is provided in **Appendix B**. The vegetation integrity scores produced by the BAM-C are summarised as the observed mean of all plots for composition, structure and function for each vegetation zone provided in **Table 3.8**.

Due to the changes in the development footprint, the vegetation integrity data was duplicated for each of the staged development. As the vegetation zones are consistent throughout the Project Area, the number of plots included in the BAM-C were kept consistent and as such the vegetation integrity score is consistent for all of the staged Development Footprint. Five of the plots were excluded from the BAM-C as there outside of the Development Footprint.

Table 3.8 Vegetation Zone Vegetation Integrity Scores

Veg Zone	PCT *Condition Class*	No. of VI plots	Composition	Structure	Function	Presence of Hollow-bearing Trees	Current Vegetation Integrity Score
1	PCT1330 *Moderate/High (Native Woodland)*	1	42.7	60.1	38.9	Absent	**46.4**
2	PCT1330 *Moderate/High (Native Derived Grassland)*	2	36.7	52.1	14.3	Absent	**30.1**
3	PCT1330 *Low (Native Derived Grassland)*	3	13.3	50.8	7.3	Absent	**17**
-	Exotic vegetation *Low (Exotic Derived Grassland)*	4	3.7	2.1	6.7	Absent	**3.7**

3.3 Threatened Ecological Communities

PCT1330– Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion corresponds directly to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) critically endangered ecological community (CEEC) listed under the BC Act.

As noted in **Section 3.2**, three vegetation zones conform to an NSW listed TEC, and two vegetation zones conform with a Commonwealth listed TEC. All three zones are considered part of the same patch where the same area is predominately native and consistent for listings under the EPBC Act. Assessment against the criteria and condition thresholds are provided below and mapping is presented in **Figure 3.4**.

3.3.1 NSW BC Act listed TECs

Each native vegetation zone was assessed against the key characteristics for BC Act listed Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in the White Box-Yellow Box-Blakely's Red Gum Woodland guidelines (DECC, 2007) and the Final Determination (NSW TSSC, 2020) as shown in **Table 3.9**. The assessment of the vegetation zones against the criteria determines that all three zones conform to the CEEC on the basis that it is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* and has a native understorey. Given the past disturbance history in the Project Area, it is important to note that remaining remnants including derived grassland (Zone 2 and 3) would (under appropriate management) respond to assisted natural regeneration where natural soil and associated seedbank are likely to be partially intact.

Table 3.9 Assessment of key characteristics for BC Act listed Yellow Box – Blakely's Red Gum Woodland TEC

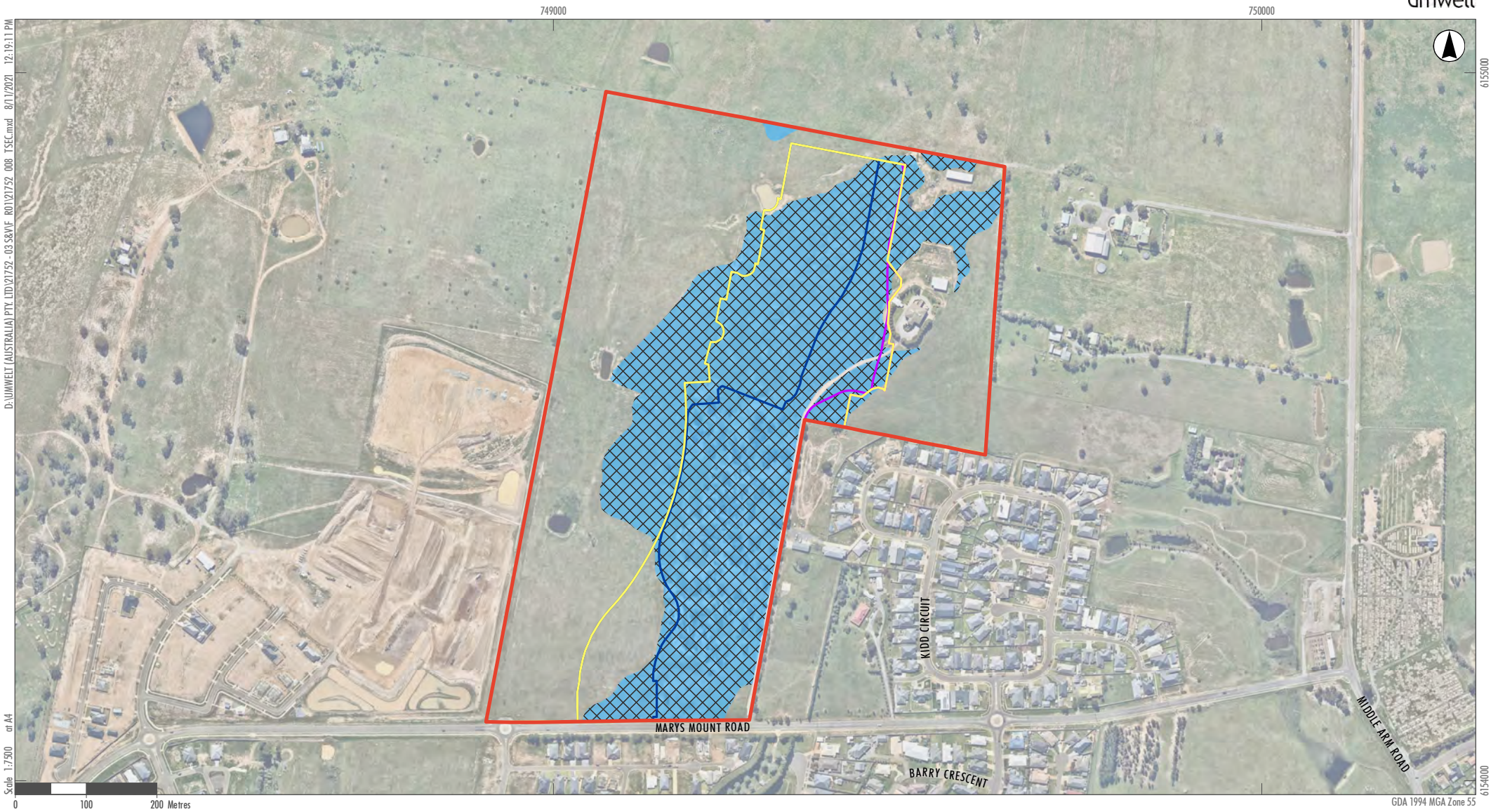
Key Characteristics	Response	Zone 1	Zone 2	Zone 3
Is the site on the tablelands or western slopes of NSW?	The Project Area is located on the South Eastern Highlands bioregion on red-brown loamy soil.	Yes	Yes	Yes
Does the site contain, or would the site have recently been likely to contain White Box, Yellow Box or Blakely's Red Gum?	Zone 1 consists of Yellow Box, or Blakely's Red Gum. Zones 2 and 3 are derived grassland, however, due to the position in the landscape and proximity to Zone 1, it's likely Zone 2 and 3 historically contained Yellow Box, or Blakely's Red Gum.	Yes	Yes	Yes
Is the ground layer mainly grassy?	Yes, all zones consist of a grassy ground layer.	Yes	Yes	Yes
If the site has been degraded, is the potential for assisted natural regeneration of the tree layer or the understorey (e.g., by removing grazing, weeds, etc)?	The Project Area has been degraded through agricultural purposes. Evidence of regeneration is present on the fringes of Zone 1 showing with young Yellow Box, or Blakely's Red Gum. All zones have potential to regenerate from the ground layer.	Yes	Yes	Yes
BC Act listed Yellow Box – Blakely's Red Gum Woodland		**Yes**	**Yes**	**Yes**

3.3.2 Commonwealth EPBC Act listed TECs

Each native vegetation zone was assessed against criteria for the Commonwealth EPBC Act listed critically endangered ecological community (CEEC) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. As shown in **Table 3.10**, Vegetation Zone 1 and Vegetation Zone 2 meet listing criteria for *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Although plot assessments in Vegetation Zone 3 identified less than 12 or more native understorey species in the understorey, this zone is considered part of the same continuous patch containing an understorey that is predominately native. Therefore, the whole patch comprising all vegetation zones is assessed against the criteria and meets the listing criteria. One small portion of Vegetation Zone 3 comprising 790 m^2 doesn't meet the patch definition and is excluded from the EPBC Act listing. This small patch is isolated and surrounded by exotic vegetation and is approximately 100 m from the main patch.

Table 3.10 Assessment against EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Criteria	Response	Zones			Whole patch*
		1	2	3	
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box, or Blakely's Red Gum?	Zone 1 contains woodland comprising Yellow Box, or Blakely's Red Gum. Zones 2 and 3 contain derived grassland, with a high likelihood to have had overstorey species Yellow Box, or Blakely's Red Gum due to the position in the landscape and proximity to Zone 1.	Yes	Yes	Yes	Yes
Does the patch have a predominantly native understorey?	All zones (1, 2 and 3) have a predominately native understorey with at least 50% of native perennial vegetation cover.	Yes	Yes	Yes	Yes
Is the patch 0.1 ha or greater in size?	All zones are part of the same patch which are greater than 0.1 ha.	Yes	Yes	Yes	Yes
There are 12 or more native understorey species present (excluding grasses)?	Zone 1 and 3 have less than the 12 native understorey species. Zone 2 has 14 native understorey species.	No	Yes	No	Yes
Is there at least one important species?	All zones have at least one important species (*Themeda triandra*, *Chrysocephalum apiculatum*, and *Chrysocephalum semipapposum*)	Yes	Yes	Yes	Yes
Is the patch 2 ha greater in size, has an average of 20 or more mature trees per hectare, or has regeneration of the dominant over storey eucalypts?	Zone 1 is greater 2 ha in size and has an average of 20 or more mature trees per hectare with evidence of overstorey regeneration. Zone 2 already meets listing criteria by having 12 or more native understorey species present and at least one important species. Zone 3 is greater than 2 ha but does not have any mature trees or evidence of overstorey regeneration.	Yes	N/A	No	Yes
EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		**Yes**			
*Patch containing a continuous area of the ecological community with an understorey that is predominately native					



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3

BC Listed Critically Endangered Ecological Communities

- White Box-Yellow Box Blakely's-Red Gum Grassy Woodland and Derived Native Grassland

EPBC listed Critically Endangered Ecological Communities

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

FIGURE 3-4

Threatened Ecological Communities

Image Source: Nearmap (2021) Data source: Capital Ecology (2019); Umwelt (2019); Wexted Advisor (2021); NSW DSFI (2021)

3.4 Threatened Species

This section provides a summary of the threatened species assessment results and addresses the potential presence of threatened flora and fauna as species credit species and/or ecosystem credit species. A total of 19 ecosystem credit species and 21 species credit species were identified in the BAM-C. Each species was reviewed using Bionet and PMST to determine the potential likelihood of the species being present within the Project Area. The review also identified potentially other threatened species that were not identified in the BAM-C. One dual credit species (Little Eagle) were included in the BAM-C based on Bionet records and the potential nest location identified within the Project Area.

3.4.1 Ecosystem Credit Species

The ecosystem credit species that are predicted to occur within the Development Footprint are shown in **Table 3.11**. Each species was predicted for vegetation zones based on habitat constraints, geographic limitations and other habitat features observed in the Project Area.

Additional fauna species not listed in the BAM-C were considered from the review of the literature and database search results. The Little Eagle was added as an ecosystem-credit species in the BAM-C due to the identification of a potential nesting site in the Project Area.

Habitat degradation and fragmentation in the landscape, as well as patch isolation, vegetation structural changes and past grazing reduces the potential for some threatened fauna occurring in the Project Area. However, the site still represents potential foraging habitat, particularly in Vegetation Zone 1 for Regent Honeyeater, Speckled Warbler, Black Falcon, Little Lorikeet, Swift Parrot, Superb Parrot, Hooded Robin and Grey-headed Flying-fox. Vegetation Zones (2 and 3) in the derived grassland also provide potential foraging for Dusky Woodswallow, Little Eagle, Scarlet Robin, Flame Robin, and Diamond Firetail.

Two ecosystem credit species (i.e., Glossy-black Cockatoo and White-bellied Sea Eagle) were removed from the BAM-C. No *Allocasuraina* or *casuarina* species were observed within the Project Area and the nearest large water body (i.e., Wollondilly River) was greater than 1km away from the Project Area.

Ecosystem credit species are used to apply the biodiversity risk weighting for determining the credit requirements for PCT/TEC ecosystem credits. This is based on the highest sensitivity to gain class for selected ecosystem credit species which applies the biodiversity risk weighting in accordance with Appendix I of the BAM.

Table 3.11 Ecosystem-credit species in the Project Area

Common Name	*Scientific Name*	Status*		Habitat Constraints/ Geographic limitations	Sensitivity to gain	Predicted Vegetation Zones
		BC Act	EPBC Act			
Regent Honeyeater	*Anthochaera Phrygia*	CE	CE	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Dusky Woodswallow	*Artamus cyanopterus*	V	-	-	Moderate	Foraging habitat in all zones
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V	-	Presence of Allocasuarina and casuarina species	High	All zones lack foraging and are excluded
Speckled Warbler	*Chthonicola sagittata*	V	-	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	-	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Black Falcon	*Falco subniger*	V	-	-	Moderate	Foraging habitat in all zones
Little Lorikeet	*Glossopsitta pusilla*	V	-	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	M	Waterbodies Within 1km of a rivers, lakes, large dams or creeks, wetlands, and coastlines	High	All zones lack suitable foraging habitat on water and are excluded.
Little Eagle	*Hieraaetus morphnoides*	V	-	-	Moderate	Foraging habitat in all zones Not identified in the BAM-C, added based on habitat assessment
White-throated Needltail	*Hirundapus caudacatus*	-	V	-	High	Surveyed, not recorded
Swift Parrot	*Lathamus discolor*	CE	CE	-	Moderate	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Hooded Robin (south-eastern form)	*Melanodryas cucullata*	V	-	-	Moderate	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	-	High	Foraging habitat in all zones
Scarlet Robin	*Pterotic boodang*	V	-	-	Moderate	Foraging habitat in all zones

Common Name	*Scientific Name*	Status*		Habitat Constraints/ Geographic limitations	Sensitivity to gain	Predicted Vegetation Zones
		BC Act	EPBC Act			
Flame Robin	*Petroica phoenicea*	V	-	-	Moderate	Foraging habitat in all zones
Koala	*Phascolarctos cinereus*	V	V	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Superb Parrot	*Polytelis swainsonii*	V	V	-	High	Foraging habitat in all zones
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	-	High	Foraging habitat only in Zone 1 (Zone 2 and 3 excluded)
Diamond Firetail	*Stagonopleura guttata*	V	-	-	Moderate	Foraging habitat in all zones

*CE=Critically Endangered, V=Vulnerable, M=Migratory

3.4.2 Species Credit Species

Nine flora and 14 fauna candidate species have the potential to occur based on the habitat needs of threatened species presented in the BAM-C. Little Eagle was added to the BAM-C due to the identified potential nesting location indicating that breeding habitat was present in the Project Area. Two species were assumed absent due to habitat constraints or geographical constraints. Habitat constraints confirmed by the site inspection removed eight species from the BAM-C.

Table 3.12 outlines the species-credit species predicted to occur in the Project Area by the BAM-C and known occurrence of the species based on survey results, and/or species range or habitat constraints. As identified in **Section 2.4.2**, seven flora and four fauna species were targeted by survey.

3.4.2.1 Species-credit species habitat suitability

Four rocky outcrops occur within the Project Area which are typically very small (<200 m2) and consist of deeply embedded rocks, with very few loose stones. The dominant grass comprising amongst the rocks includes *Austrostipa* spp. and *Rytidosperma* spp. These areas provide marginal habitat for Pink-tailed Legless lizard and potential habitat for Striped Legless Lizard. Further assessment of rocky habitats for these species is described in **Table 3.12.**

Thirty-one (31) hollow-bearing trees were recorded in Zone 1 of the Project Area. Hollows vary in size and type and occur in a range of different *Eucalyptus* tree species. Hollows provide potential refuge and nesting opportunities for hollow-dependent species-credit species, including Superb Parrot, Squirrel Glider, and Southern Myotis. Due to past land-use changes such as land clearing and grazing, the Zone 1 woodland patch is isolated and partially degraded. These factors limit the occurrence of species credit species which are assessed and described in **Table 3.12**.

Table 3.12 Species-credit species' status in the Project Area

Species Name	Status		Sensitivity to Gain	Habitat constraints / geographic limitations	Presence/absence based on survey and habitat assessment
	BC Act	EPBC Act			
Regent Honeyeater *Anthochaera phrygia* (breeding habitat)	CE	CE	High	As per OEH mapped areas	**Assumed absent.** There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. Breeding habitat is not within the Project Area. No important areas (presumed present) are mapped in Project Area. The species is therefore not a species credit species in this location. No survey is required.
Pink-tailed Legless lizard *Aprasia parapulchella*	V	V	High	Rocky areas Or within 50 m of rocky areas	**Habitat absent.** Small rocky outcrops occur in derived grassland of Zone 2 and Zone 3 which are typically very small (<200 m^2) and consist of deeply embedded rocks, with very few loose stones. The dominant grass comprises *Austrostipa* spp. and *Rytidosperma* spp. Rocky outcrops are isolated and do not occur near waterways and have no connectivity to other potential habitat areas. An opportunistic rock-rolling survey of surface rocks was completed to search for threatened reptiles in 2015 by NGH (2017) which did not detect the species. Given these conditions, including the lack of *Themeda triandra* near rocks the Project Area is considered not to comprise suitable habitat for this species. No further survey required.
Thick Lip Spider Orchid *Caladenia tessellata*	E	V	High	-	**Assumed absent.** Outside known geographic range. Is known from the Sydney area Wyong, Ulladulla and Braidwood in NSW. Other locations in NSW presumed extinct.
Glossy Black-Cockatoo *Calyptorhynchus lathami* (Breeding)	V	-	High	Hollow bearing trees Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground	**Habitat absent.** There is no suitable breeding habitat in the Development Footprint. Foraging habitat is absent. Large mature hollow bearing trees are present in the Project Area, although absent from the Development Footprint, however there are no food resources in the study locality that would support a breeding population.

Species Name	Status		Sensitivity to Gain	Habitat constraints / geographic limitations	Presence/absence based on survey and habitat assessment
	BC Act	EPBC Act			
Striped Legless Lizard *Delma impar*	V	V	Moderate	-	**Surveyed absent.** Artificial shelter (tile) survey was conducted using 10 tile grids across the site by NGH (2016). Tiles were checked 10 times between 2 September to 15 December 2016. No Striped Legless Lizards or any other threatened reptile species were recorded during the tile surveys. An additional opportunistic rock-rolling survey of surface rocks at small rocky outcrop locations was completed to search for threatened reptiles in 2015 by NGH (2017).
White-bellied Sea-Eagle *Haliaeetus leucogaster* (Breeding)	V	M	High	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands, and coastlines	**Habitat absent.** There is no suitable breeding habitat in the Development Footprint. Large mature trees are present in the Project Area; however, vegetation is greater than 1 km from Wollondilly River, large dams and other waterways.
Little Eagle *Hieraaetus morphnoides* (Breeding)	V	-	Moderate	Nest trees - live (occasionally dead) large old trees within vegetation	**Surveyed present.** A stick nest is present in the Project Area recorded by Umwelt. A Little Eagle was also observed flying over the Project during December 2018 surveys recorded by Capital Ecology. Little Eagle was not recorded during NGH bird surveys. Breeding habitat for Little Eagle is assumed present.
Swift Parrot *Lathamus discolor* (Breeding)	E	CE	Moderate	As per OEH mapped areas	**Habitat absent.** No important areas (presumed present) are mapped in Project Area. The species is therefore not a species credit species in this location. No survey is required.
Aromatic Peppercress *Lepidium hyssopifolium*	E	E	High	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-20 m apart throughout areas of native vegetation.
Hoary Sunray *Leucochrysum albicans var. tricolor*	-	E	Moderate	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-20 m apart throughout areas of native vegetation.

Species Name	Status		Sensitivity to Gain	Habitat constraints / geographic limitations	Presence/absence based on survey and habitat assessment
	BC Act	EPBC Act			
Large Bent-winged Bat *Miniopterus orianae oceanensis* (Breeding)	V	-	Very High	Caves Cave, tunnel, mine, culvert, or other structure known or suspected to be used for breeding including species records.	**Habitat absent.** No further survey required. Habitat assessments were conducted by Umwelt in 2019. An Anabat survey (2016) was conducted by NGH (2017). Cave, tunnel, mine, culvert structures are absent. There is a shed (artificial structures) within the Development Footprint but is not suspected to be used by the species. Anabat surveys did not detect the species. No further targeted surveys are required.
Southern Myotis *Myotis macropus*	V	-	High	Hollow bearing trees Within 200 m of riparian zone. Bridges, caves, or artificial structures within 200 m of riparian zone/waterbodies. This includes rivers, creeks, billabongs, lagoons, dams, and other waterbodies on or within 200 m of the site	**Habitat absent.** No further survey required. Habitat assessments were conducted by Umwelt in 2019. An Anabat survey (2016) was conducted by NGH (2017). The Project Area is not within 200 m of waterways. Hollow bearing trees are present in the Project Area, but not the Development Footprint. Cave, tunnel, mine, culvert structures are absent. There is a shed (artificial structures) within the Project Area, however it is not within proximity of any waterways. Anabat surveys did not detect the species. No further targeted surveys are required.
Squirrel Glider *Petaurus norfolcensis*	V	-	High	-	**Habitat absent.** No further survey required. Habitat assessments were conducted in 2019 to identify suitable habitat. Although hollow-bearing trees are present in the Project Area, the Development Footprint does not support trees suitable for roosting or foraging. The Project Area as a whole is degraded to an extent that it is unlikely to support this species due to the isolation of the vegetation patch and associated habitat degradation. No further targeted surveys are required.
Koala *Phascolarctos cinereus* (Breeding)	V	V	High	Areas identified via survey as important habitat (see comments)	**Habitat absent.** No further survey required. Habitat assessments were conducted in 2019 to identify suitable habitat. Although food trees are present in the Project Area, the Development Footprint is unlikely to support this species due to the isolation of the vegetation patch and associated habitat degradation. No further targeted surveys are required.

Species Name	Status		Sensitivity to Gain	Habitat constraints / geographic limitations	Presence/absence based on survey and habitat assessment
	BC Act	EPBC Act			
Superb Parrot *Polytelis swainsonii* (Breeding)	V	V	High	Hollow bearing trees. Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5 cm diameter. Greater than 4m above ground or trees with a DBH of greater than 30 cm.	**Surveyed absent.** A breeding season survey was conducted of the Project Area and broader locality by Capital Ecology in December 2018. Suitable large hollow bearing trees in Zone 1 were also inspected. Surveys were completed in accordance with Commonwealth survey guidelines. The species was not detected during surveys. No further targeted surveys are required.
Tarengo Leek Orchid *Prasophyllum petilum*	E	E	High	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-50 m apart throughout areas of native vegetation.
Grey-headed Flying-fox *Pteropus poliocephalus* (Breeding)	V	V	High	Breeding Camps	**Habitat absent.** No breeding colony observed during habitat assessments and meander transects. No densely vegetated riparian areas potentially suitable for breeding colonies was present.
Button Wrinklewort *Rutidosis leptorrhynchoides*	E	E	High	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-50 m apart throughout areas of native vegetation.
Small Purple-pea *Swainsona recta*	E	E	High	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-50 m apart throughout areas of native vegetation.
Silky Swainson-pea *Swainsona sericea*	V	-	High	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-50 m apart throughout areas of native vegetation.

Species Name	Status		Sensitivity to Gain	Habitat constraints / geographic limitations	Presence/absence based on survey and habitat assessment
	BC Act	EPBC Act			
Golden Sun Moth *Synemon plana*	E	CE	Moderate	Wallaby grass (*Rytidosperma* sp.), Chilean needlegrass (*Nassella nessiana*) or Serrated Tussock (*Nassella trichotoma*).	**Surveyed absent.** Meandering transects were completed in suitable habitat during appropriate flying periods in November 2015, December 2018, and November/December 2019. No moths were detected during surveys. No further targeted surveys are required.
Austral Toadflax *Thesium australe*	V	V	Moderate	-	**Surveyed absent.** This species was not recorded during targeted threatened flora surveys during in 2019. It was also not detected during other targeted surveys in 2015 and 2016 by NGH. Parallel transects were walked 10-50 m apart throughout areas of native vegetation.
Paddys River Box *Eucalyptus macarthurii*	E	E	High	-	**Surveyed absent.** This species was recently added into the BAM-C. This species is often found on flats near swamps and streams and at moderately high altitudes. No swamps or streams were observed in the Project Area. All regenerating and mature trees were identified to species level during HBT surveys in 2019, and the species was absent, with no rough barked trees present on site. .

*CE=Critically Endangered, E= Endangered, V=Vulnerable, M=Migratory

3.4.2.2 Threatened Flora

No BC Act or EPBC Act listed threatened flora were detected during the targeted surveys. Surveys conducted met minimum survey requirements, including seasonal survey requirements, and therefore all BC Act listed species credit species are considered absent from the site according to the BAM (DPIE, 2020a) (**Table 3.12**). It should be noted that all flora survey routes from previous ecology studies were unavailable and not provided in the BDAR (NGH, 2017; Capital Ecology, 2018).

3.4.2.3 Threatened Fauna

One BC Act listed vulnerable species, Little Eagle, which was assessed as potentially breeding within part of the site. No evidence of other listed BC Act or EPBC Act fauna candidate species' were recorded during targeted surveys.

Little Eagle was observed flying over the Project Area by Capital Ecology (2018). The presence of potential Little Eagle breeding habitat was determined on the basis of one stick nest was observed in a *Eucalyptus melliodora* tree within Zone 1 outside the Development Footprint, but inside the Project Area **(Photo 3.1)** (**Figure 3.5**). Little Eagles use mature, living trees (sometimes dead trees) to build nests that are lined with sticks and leaves and often forage large areas of rural land. These habitat features are typical of the woodland structure in Zone 1 and study locality.

The nest is an adequate size for use by Little Eagle. The nest is likely too small to be utilised by Wedged-tailed Eagle (*Aquila audax*). The nest had no signs of active use, and no Little Eagle was observed during surveys (outside the breeding period). However, nests can be unattended by Little Eagle which are known to alternate between nests in different breeding years (Debus and Ley, 2009; Debus et al. 2013). Little Eagles are known to have large home ranges estimated to be greater than 65 km^2 and can travel long distances (Brawata and Gruber, 2016). Recent local sightings of Little Eagle in the Goulburn region, particularly along Wollondilly River and Mulwaree River were recorded from Bionet and eBird (2019).

The nest site is currently in proximity to an urban dwelling which is known to exert noise disturbance from recreational motorcycle use. However, when considering the known presence of Little Eagle in the locality, the potential on-site foraging habitat and ongoing degradation of habitat in the region it has been assumed that the nest site is likely to be important breeding habitat and may sustain the future population.

A species polygon was generated in the Development Footprint. Where a breeding site has been identified in accordance with the BAM the species buffer polygon should be established by providing a circular polygon with a 300 m radius around the nest tree. The purpose of the buffer is to minimise disturbance/avoid clearing, for a development application, within the area essential for breeding. This includes habitat suitable for feeding/grooming perches and fledgling requirements. It does not account for foraging habitat.

Photo 3.1 Raptor stick nest observed in Zone 1 within the Project Area

3.4.3 Species Habitat Polygon and Biodiversity Risk Weighting

Species habitat polygons are presented in **Table 3.13**. The Development Footprint covers 7.38 ha of the species polygon for Little Eagle, based on a 300 m buffer around a stick nest potentially utilised by Little Eagle in accordance with advice on the TBDC (DPIE, 2019d). The Little Eagle nest site and species polygon are shown in **Figure 3.5**. The species polygon has been restricted to areas of native vegetation and excludes exotic vegetation and non-vegetated areas (i.e., houses and farm dams).

The biodiversity risk weighting for determining the credit requirement for species credits is based on the sensitivity to loss and the sensitivity to gain for the species. Credit requirements are outlined in **Section 8.0**.

Table 3.13 Species credit Species Habitat Polygons and Risk Weightings

Species	Biodiversity Risk Weighting	Species Habitat Polygon Area (ha) within the Stage 1 Development Footprint	Species Habitat Polygon Area (ha) within the Stage 2 Development Footprint	Species Habitat Polygon Area (ha) within the Stage 3 Development Footprint	Total Species Habitat Polygon (ha)	Species Habitat Polygon Description
Little Eagle	1.5	3.59	3.46	0.33	7.38	The 300 m buffer around the nest. Exotic vegetation and non-vegetation was excluded.

3.5 Candidate Features for Additional Prescribed Impacts

The Project Area supports four (4) small areas of rocky outcrops with loose rocks associated with exposed siltstone and fine-grained sandstone, and prophyritic quartz monzodiorite. Rocky areas are typically very small (<200 m2) and consist of deeply embedded rocks, with very few loose stones. The dominant grass comprises *Austrostipa* spp. and *Rytidosperma* spp. Rocky outcrops are isolated and do not occur near waterways. An opportunistic rock-rolling survey of surface rocks and targeted tile surveys was completed to search for threatened reptiles in 2015 by NGH (2017), and no threatened species were detected. These rock habitats are unlikely to support threatened reptiles including Striped Legless Lizard and Pink-tailed Worm-lizard. However, rocks do support a rocky derived grassland TEC (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland BC Act and EPBC Act) which provide a microclimate and habitat niche for the occurrence of different plant species and variation in the broader ecological community. The extent of rock outcropping present in the Project Area is mapped in **Figure 3.5**.

There is a shed (artificial structures) within the Project Area but is not suspected to be used by the bat species. Anabat surveys completed in previous ecological assessments did not detect any species-credit species.

Non-native vegetation has been excluded from the habitat polygon for the Little Eagle. It is unlikely that the exotic vegetation (which is exotic grassland) would be important foraging habitat for the species given that the surrounding Development Footprint is largely dominated by exotic vegetation. The species habitat polygon focuses on the breeding requirements and suitable habitat for fledglings. As such, exotic vegetation is not identified as a prescribed impact.

Three (3) farm dams occur in the Project Area which may provide habitat for aquatic species such as frogs and fish. All dams were degraded and had little to no aquatic vegetation and are unlikely to provide habitat for threatened species.

No other candidate features for additional prescribed impacts were identified.

Potential for prescribed impacts to additional biodiversity values is addressed further in **Section 5.2**.

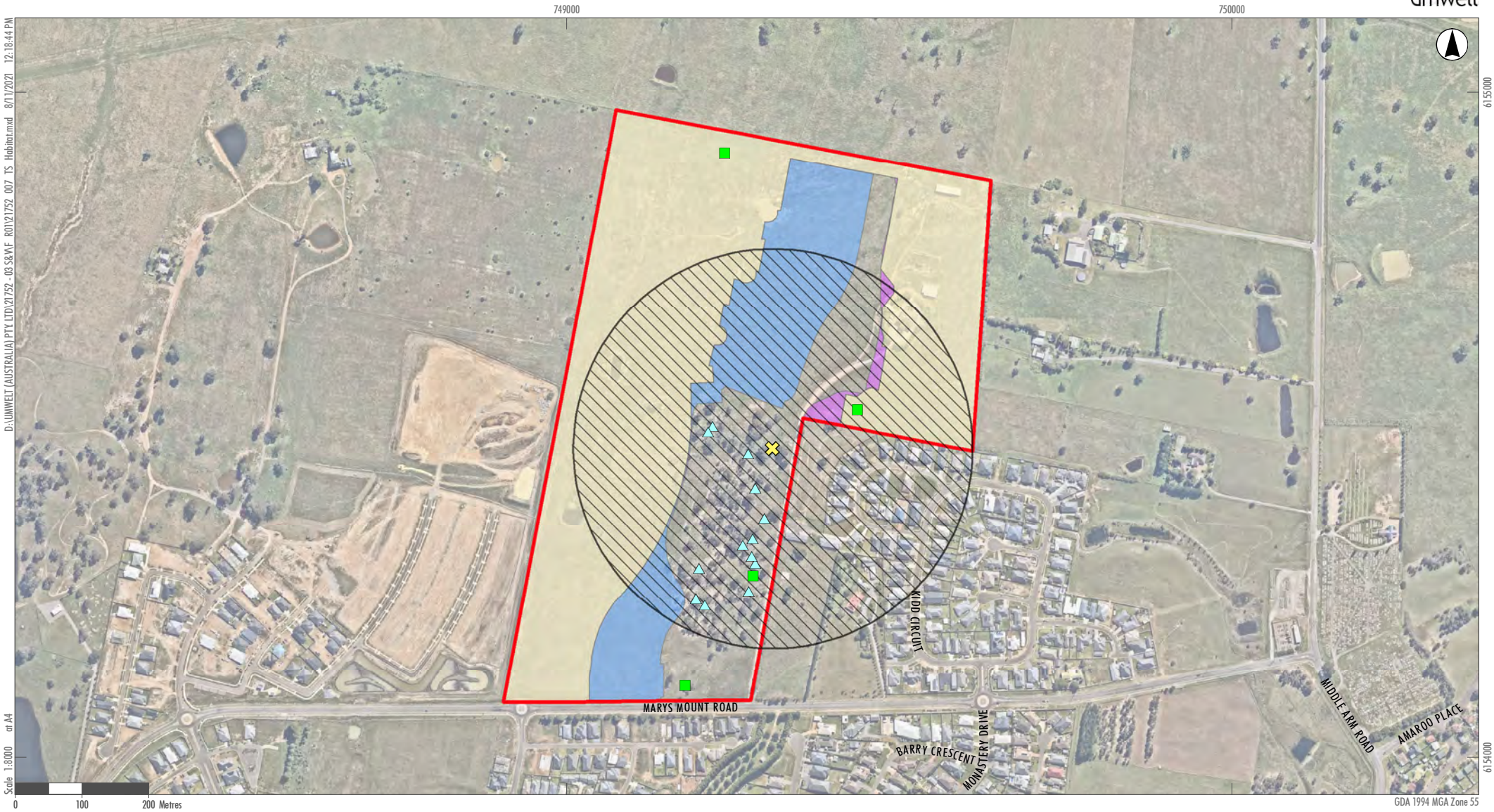


FIGURE 3-5

Species-credit Species and Habitat Polygons

Image Source: Nearmap (2021) Data source: Umwelt (2019); DevCore (2021); NSW DSFI (2021)

4.0 Avoidance of Impacts

4.1 Avoidance of Impacts

4.1.1 Avoidance of Impacts on Native Vegetation and Habitat

Planning for the project has taken into consideration the avoidance of the areas with the greatest ecological values and the masterplan vision was to consider and protect the majority of native vegetation with ecological value within the Project and retain an ecological corridor through the project. A primary focus of the project masterplan design was to avoid impacts on woodland supporting a mature canopy of trees to the maximum extent possible. This avoidance of mature woodland also enabled avoidance of hollow-bearing trees and associated fauna habitat. Where possible, impacts have been prioritised in areas supporting exotic grassland, however, avoidance of impacts to derived native grasslands was not possible.

The resulting plan delivers on this vision in full and creates a masterplan that protects the retained ecological corridor, creating a central place and outlook for the future residents and users of the site.

Approximately 43% of the total area of disturbance supports exotic grassland. Native vegetation to be removed is primarily derived native grassland (Zone 2 and Zone 3, comprising 51% of the total area of disturbance). A small proportion, 5%, of the total area of disturbance will impact the higher quality woodland areas that support remnant and regenerating canopy species (Zone 1). All attempts in the design phase have been undertaken to avoid the higher-quality native vegetation.

The biodiversity surveys identified that the Development Footprint contains Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act and EPBC Act, and potential threatened species habitat, including breeding habitat for Little Eagle. Direct impacts to these biodiversity values have been minimised where possible by avoiding areas of remnant woodland PCT1330– Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-eastern Highlands Bioregion (i.e., the majority of Zone 1). Overall, the project would avoid 8.36 ha of the existing native vegetation in the Project Area. Of this, 5.75 ha is woodland (Zone 1), and 2.89 ha is derived grassland (Zone 2 and 3). All large mature hollowing bearing trees and the Little Eagle stick nest in the Project Area would be avoided, and no habitat features of these types impacted directly.

Indirect impacts to retained Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC would be minimised and avoided where possible by implementing appropriate construction environmental management controls such as pre-clearing protocols, permanent fencing around the listed CEEC and a Construction Environment Management Plan (CEMP).

4.1.2 Avoidance of Prescribed Impacts

No prescribed impacts are anticipated to occur.

The waterways downstream of the Development Footprint area are already located in a developed urban context and are unlikely to be substantially modified by the development. Potential impacts to water quality and sedimentation would be mitigated by implementing standard erosion and sediment controls during construction. Water quality control measures are proposed, including bioretention basins to capture and filter stormwater and runoff from the Project Area which would manage water quality during operations. It is unlikely that impacts to water quality, water bodies and hydrological processes would affect threatened species or ecological communities.

The proposed development area is already surrounded by urban roads and development to the west, east and south. While vehicle activity in the Development Footprint will increase during construction and operation, it is unlikely that there would be a substantial increase in fauna mortality within the local landscape. Impacts of vehicle strike on threatened species or on animals that are part of the Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and impacts to rocky habitats would be minimised where possible by implementing appropriate construction environmental management controls such as permanent fencing around the listed CEEC and a (CEMP).

4.2 Mitigating and Managing Impacts

4.2.1 Minimisation Measures

The project would involve reasonable measures to mitigate remaining direct and indirect impacts to biodiversity where possible in line with Section 7 of the BAM. Reasonable measures are outlined in (**Table 4.1**)**.** Measures include the timing, action, outcome, and responsibility of these measures. Each of these control measures will contribute to the maintenance of habitat adjacent to the Development Footprint.

Table 4.1 Measures to mitigate and manage impacts to biodiversity

Measure	Timing	Responsibility	Mitigation Measure	Outcome
Preliminary ecological site inspection	Pre-project design	N/A	N/A	Preliminary assessment of areas of avoidance to inform project design.
Location and design of works in existing disturbed areas.	Project design	N/A	N/A	Focus impacts on areas of low biodiversity value.
Demarcation of approved clearance boundaries	Prior to clearance and during clearance activities	Site Manager	Clearly identify, through signage and exclusion fencing, areas not proposed for clearance.	Minimisation of unnecessary impacts to surrounding vegetation and habitats.
Fencing and access control	Construction and operation	Site Manager	Where required, fencing will not include barbed wire on the top line of the fence. Erection of signage and exclusion fencing to prevent vehicle egress to adjacent sensitive environmental areas (including retained CEEC patches) during construction and on a permanent basis during the residential operation of the site. Access controls to be consistent with NSW construction guidelines Permanent fencing around retained CEEC patches, particularly along adjacent roads to prevent native fauna mortality from vehicle strike. Fencing would help protect retained woodland from illegal wood collection and rubbish dumping.	Provides for access control to avoid unwanted human interference and disturbance to non-operational areas. Minimisation of impacts to native fauna species from the use of barbed-wire fences. Vehicle access restricted in retained CEEC patches. Reduce risk of vehicle strike on animals such as Eastern Grey Kangaroo.

Measure	Timing	Responsibility	Mitigation Measure	Outcome
Weed management	Construction and operation	Site Manager Goulburn Mulwaree Council	Chemical and physical removal of invasive weed species in accordance with the Noxious and Environmental Weeds Handbook (DPI 2014). Documentation and implementation of appropriate weed management controls through the Construction Environmental Management Plan. Ongoing weed management in for retained CEEC patches as guided by a management plan following development by Goulburn Mulwaree Council to meet obligations as a Local Control Authority under the Biosecurity Act 2015 (BA Act).	Minimisation of environmental and High Threat Weeds and priority weeds as defined BA Act. Minimisation of weed spread from and into the wider locality. Ongoing weed management in line with standard Goulburn Mulwaree Council weed management obligations. Reduce and maintain weeds in retained areas of Zone 1.
Pest animal and domestic predator control	Operation	Goulburn Mulwaree Council	Ongoing Pest management consistent with Goulburn Mulwaree Council procedures. Pets within the new subdivision would be contained in a manner consistent with Goulburn Mulwaree Council policy.	Minimise potential impacts to native fauna species from out-competition and/or predation by pest, feral or pet animal species.
Bushfire management	Construction and operation	Site Manager Goulburn Mulwaree Council	Bushfire management will consider asset protections and the consideration of the sensitivities of threatened species and threatened ecological communities.	Protect life and property, while supporting appropriate conditions for the existing ecological features.
Erosion and sedimentation control	Construction	Site Manager	Divert run-off water around disturbed areas. Measures must be taken to prevent impacts to waterways during extreme storm events that are likely to increase the transport and flow of sediment from the Development Footprint. Preparation and implementation of a site-specific Erosion and Sediment Control Plan during the construction phase, to ensure that adjacent CEEC patches are not adversely impacted by overland surface water flows or sediment movement from the construction site, particularly in the up slope north east of the Development Footprint. Document and implement erosion and sediment management controls through the Construction Environmental Management Plan.	Provide stability of the land surface and downstream water quality in Wollondilly River during construction.

Measure	Timing	Responsibility	Mitigation Measure	Outcome
Stormwater retarding basins and dewatering dams	Design and operation	Design team Goulburn Mulwaree Council	Integrate retarding basins in site design to capture urban runoff consistent with Water Sensitive Urban Design principles. Maintain stormwater retarding basins to manage downstream water quality.	Maintain no decline in water quality in associated drainage lines and subsequently Wollondilly River downstream during construction and operation.
Landscaping plan	Post construction	Site Manager	A Landscape Management Plan is to be developed to provide specific details for the establishment any revegetation, including artificial wetlands (Drainage Reserves). Street trees are proposed in all verges at one tree per lot. The proposed streetscape is characterised by intervals of exotic trees set in a grassed verge. The Landscape Management Plan should aim to revegetate buffer lands using the same species composition and structure as currently exists on the site and include a program for monitoring and maintenance of plantings. All planting should be in line with bushfire planning and protection.	Aims to increase and maintain biodiversity habitat where possible.
Monitor and review	All stages	Site Manager	A review of mitigation measures (including a checklist) should be developed to ensure that all measures proposed have been undertaken.	Measurable and achievable goals to minimise impacts are met.

5.0 Assessment of Impacts

5.1 Impacts on Native Vegetation and Habitat

The Project would have direct and indirect impacts on a range of biodiversity values during construction and operation. Impacts on native vegetation and habitat are assessed in accordance with Section 8 of the BAM.

5.1.1 Direct Impacts

The area of direct impact relates to permanent loss and removal of vegetation and habitat within the whole Development Footprint. Direct impacts on biodiversity values would comprise:

- A total of 10.65 ha of native vegetation and threatened fauna foraging habitat comprising PCT 1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, and critically endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed under both BC Act and EPBC Act).

- A total of 7.38 ha of native vegetation within the species polygon for Little Eagle. Native vegetation to be cleared comprises small portions of woodland and derived grassland, which is included to minimise disturbance within the area of breeding habitat and habitat features for fledging requirements such as feeding, grooming and perches.

- The Development Footprint also supports 19.78 ha of exotic vegetation, which is not classified as native vegetation based on the results of floristic sampling and plot-based assessments.

- Direct impacts on native vegetation and threatened fauna habitat are summarised in **Table 5.1** and **Figure 5.1** and **Figure 5.2**. **Table 5.1** illustrates the location of direct impacts on vegetation zones and fauna habitat for each development stage. Avoidance and mitigation measures associated with minimising the impacts of these direct impacts are discussed in **Sections 4.0** and **6.0**.

Table 5.1 Direct Impacts on biodiversity values in the Development Footprint

Biodiversity value	Veg Zone	Status	Stage 1 Area (ha)	Stage 2 Area (ha)	Stage 3 Area	Total Area (Ha)
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-eastern Highlands Bioregion	1	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered BC Act and EPBC Act)	0.47	0.24	0.00	0.71
	2		0.24	2.12	0.32	2.68
	3		4.44	2.79	0.03	7.26
Little Eagle (breeding habitat – native vegetation)	NA	Vulnerable BC Act	3.59	3.46	0.33	7.38
Exotic vegetation		None	17.75	2.02	0.004	19.77
Total Impact on Native Vegetation			**5.15**	**5.14**	**0.14**	**10.65**
Total Little Eagle (Breeding Habitat)			**3.59**	**3.46**	**0.33**	**7.38**

5.1.2 Indirect Impacts

Avoided native vegetation and habitat have the potential to be indirectly impacted by the project. The larger and more diverse a patch is, the more important it is especially those that link remnants in the landscape. Direct clearing in the Development Footprint would reduce the overall patch size of the retained TEC and increase fragmentation. A smaller patch is more susceptible to weed invasion, increased loss of species diversity, reduced ecosystem function and is at a higher risk of extinction.

These impacts have been assessed with a 50 m buffer from the edge of the direct impact boundary for each of the development (**Figure 5.1** and **Figure 5.2**). It is noted as the development progresses through the stages, the indirect impacts would become obsolete as the indirect impacts will overlap with the direct impact (i.e., removal of vegetation).

The indirect impacts would include:

- A total of 5.06 ha of native vegetation (i.e., 2.58 ha in Vegetation Zone 1, 2.06 in Vegetation Zone 2 and 0.42 ha in Zone 3) being indirectly impacted. Other lands (outside Project Area) in the surrounding area are either residential or cleared land for agricultural purposes and would not be substantially indirectly impacted.
- A total of 3.90 ha of native vegetation within the Little Eagle 300 m buffer (i.e., 2.14 ha in Vegetation Zone 1, 1.48 in Vegetation Zone 2 and 0.29 ha in Zone 3) being indirectly impacted.

Habitat connectivity is unlikely to be indirectly impacted. Of the remaining biodiversity values, habitat connectivity is unlikely to be indirectly fragmented which currently provides movement for fauna species able to move through a cleared and rural landscape. The woodland patch in Vegetation Zone 1 would become surrounded by urban housing and provide connectivity for mobile species capable of flying large distances between habitat patches through a peri-urban landscape.

Other indirect impacts such as noise, dust, light emissions, erosion and stormwater, off-site vehicle movement, rubbish dumping, wood collection, weeds, feral animals, and domestic predators (cats and dogs) may occur during the construction and operation of the Project. Some edge effects such as changes in microclimate and hydrology are unlikely to substantially affect adjacent vegetation where the edges of woodland and derived native grassland are already exposed to cleared land. These edges would however be vulnerable to further potential damage from increased human activity, particularly from rubbish dumping, wood collection, vehicle access and pest animals. Fencing in these areas would help reduce impacts to native vegetation and fauna habitat. Transport of weeds and pathogens into retained vegetation is likely to increase during the construction and operation of the project.

Indirect impacts are discussed in the context of the Project Area and study locality in **Table 5.2**. Indirect adverse impacts are not expected to be significant in relation to threatened biodiversity due to the existing disturbed nature of the Development Footprint.

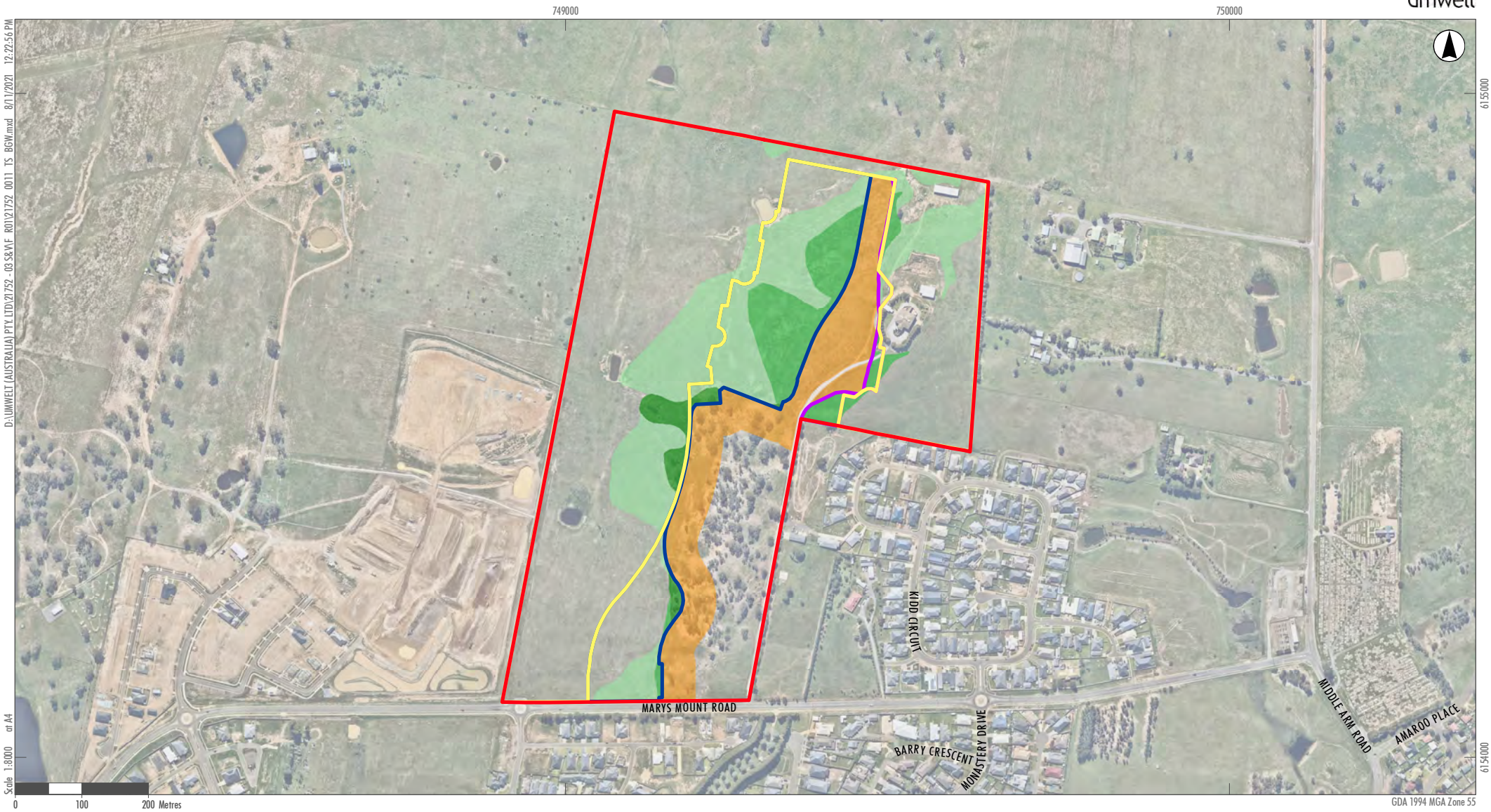
The nesting occupancy of Little Eagle may become infrequent, or the nest may become permanently abandoned due to increased noises, vibrations and human activity during construction and operation. The nest site is currently in proximity to an urban dwelling which is known to exert noise disturbance from recreational motorcycles. Little Eagles are known to be flushed away from nests by approaching observers (Debus & Ley, 2006).

Table 5.2 Potential indirect impacts during construction and operation in the Project Area and broader locality

Indirect impact	Impacted entities	Extent	Frequency/Duration	Consequence
Disturbance to specialist breeding habitat	Nesting Little Eagle	3.90 ha (of 300 m buffer)	Short-term (construction) Long-term (operation)	Little Eagle may become infrequent, or nest may become permanently abandoned over time due to overall disturbances to retained habitat containing stick nest.
Noise	Nesting Little Eagle and other non-threatened native fauna	Zone 1 (2.14 ha) 3.90 ha (of 300 m buffer)	Daily, during construction and operation Short-term (construction) Long-term (operation)	Noise may disturb the roosting and foraging behaviour of fauna species and reduce the occupancy of areas of suitable habitat. The Little Eagle may be impacted, resulting in the nest to become abandoned. However, the site already receives disturbance from recreational motorcycles in adjacent property. Noise emissions are likely to cause greatest impact during construction.
Dust impacts	Native vegetation (TEC) and fauna habitat	Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Daily, during construction Short-term (construction)	Dust impacts have the potential to adversely impact native species during ground disturbing works. Potential impacts include dust covering vegetation thereby potentially reducing vegetation health and growth and affecting vegetation integrity. Dust may also affect air quality and affect health of fauna. The construction environmental management will include inherent measures to minimise the potential for adverse dust impacts.
Light emissions	Nesting Little Eagle and other non-threatened native fauna	Zone 1 (2.14 ha) 3.90 ha (of 300 m buffer)	Daily, during construction and operation Short-term (construction) Long-term (operation)	Light emissions may disturb the roosting and foraging behaviour of fauna species, and reduce the occupancy of areas of suitable habitat, in particular the Little Eagle. Impacts resulting from light emissions are not expected to be of any level of significance in relation to threatened species, populations, and ecological communities.

Indirect impact	Impacted entities	Extent	Frequency/Duration	Consequence
Erosion, stormwater runoff and changed hydrology	Frogs and aquatic fauna	Off-site drainage lines, Wollondilly River (downstream) Aquatic habitats and riparian vegetation Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Short-term (construction) Long-term (operation)	Water quality may decline as a result of uncontrolled runoff from construction site into downstream aquatic environments, including the Wollondilly River. There is also potential for overland surface flow from construction activities in the upslope north eastern portions of the Development Footprint that may impact on retained TEC downslope. Once operational, the project may also change hydrology between retained and removed TEC patches. Mitigation measures outlined in **Section 4.2**. will be implemented to minimise the potential for impacts on downstream water quality during construction and operation.
Off-site vehicle impacts and vehicle strike	Native vegetation (TEC) and fauna habitat Native fauna, especially kangaroos	All of Project Area	Short-term (construction) Long-term (operation)	Movement of construction machinery or public vehicles may result in compaction of the soil and degradation of native vegetation and habitats adjacent to the development footprint. Mitigation measures outlined in **Section 4.2** will be implemented to minimise the potential for vegetation and habitat degradation as a result of vehicle movement in adjacent areas.
Rubbish dumping	Native vegetation (TEC) and fauna habitat	Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Short-term (construction) Long-term (operation	Rubbing dumping has potential to cause contamination, harm the health of flora and fauna, and create fire hazards.
Wood collection	Native vegetation (TEC) and fauna habitat	Zone 1 (1.51 ha)	Long-term (operation)	Coarse woody debris and logs are important habitat for native fauna. Loss of fallen wood would cause decline in flora and fauna habitat and reduce vegetation integrity.

Indirect impact	Impacted entities	Extent	Frequency/Duration	Consequence
Transport of weeds and pathogens into adjacent areas	Native vegetation (TEC) and fauna habitat	Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Short-term (construction) Long-term (operation	Weeds and/or pathogens could be inadvertently brought into the Development Footprint on equipment and machinery, could invade naturally through removal of native vegetation or invade from new residential households. The presence of weed species within the Development Footprint has the potential to decrease vegetation integrity in adjacent native vegetation. Mitigation measures outlined in **Section 4.2** will be implemented to minimise the potential for weed encroachment into areas within the Development Footprint.
Pest animal species	Native vegetation (TEC) and fauna habitat	Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Short-term (construction) Long-term (operation	Populations of feral fauna species such as foxes, rabbits, cats can increase and quickly populate new areas as a result of disturbance and urban development. Mitigation measures outlined in **Section 4.2** will minimise the potential for feral animal spread and impacts into surrounding areas around the Development Footprint.
Domestic predators	Native vegetation and fauna habitat	Zone 1 (2.58 ha) Zone 2 (2.06 ha) Zone 3 (0.42 ha)	Short-term (construction) Long-term (operation	Domestic predators may hunt threatened species in habitat adjacent to urban development. The site is within 1 km of existing residential areas. Pets within the proposed development must be contained in a manner consistent with Goulburn Mulwaree Council policy.



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Indirect Impact on Native Vegetation (50m Buffer)

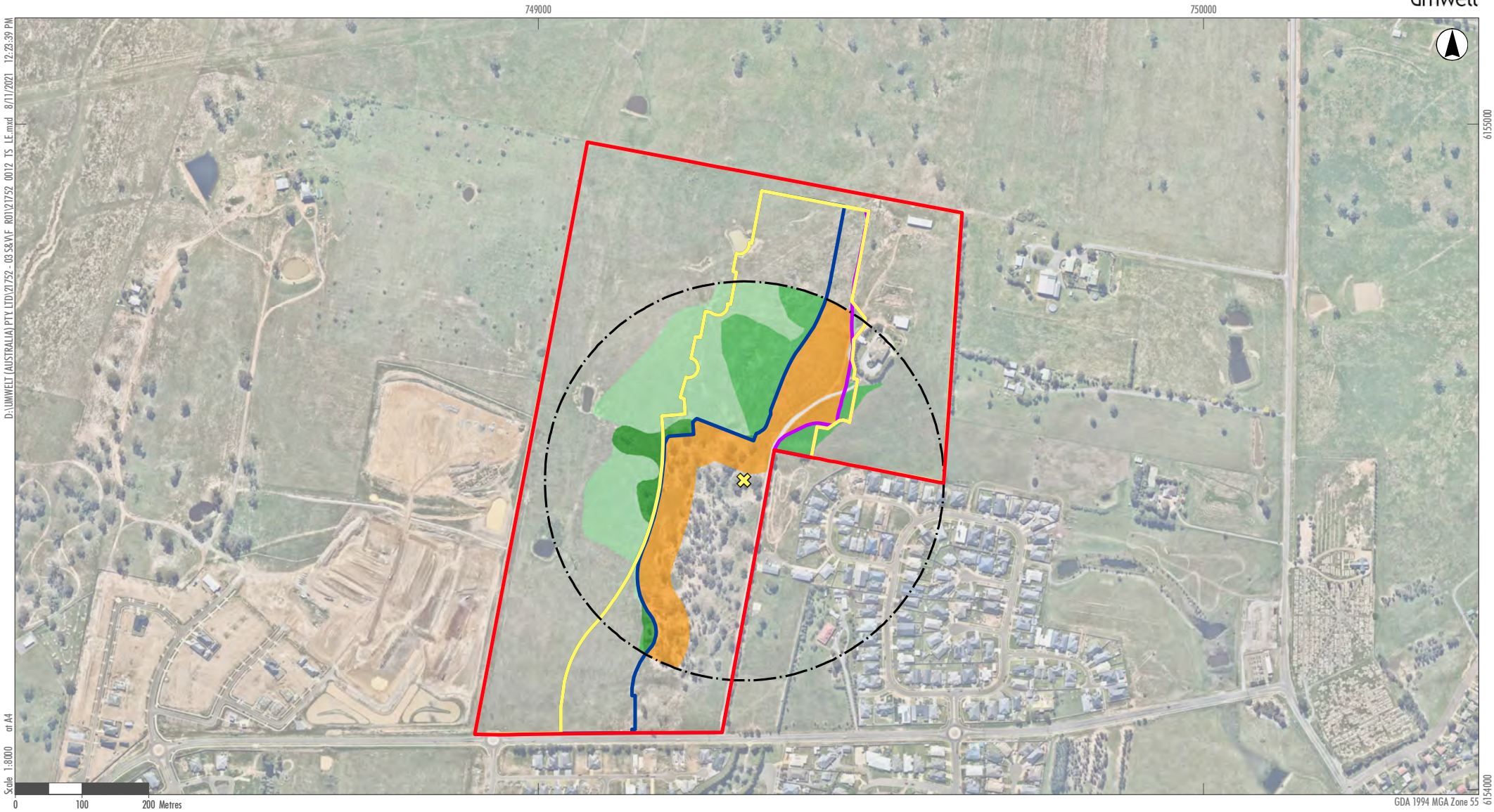
Direct Impacts on Native Vegetation and TECs at risk of Serious and Irreversible Impacts

- Zone 1 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 2 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 3 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

FIGURE 5-1

Impacts (Direct and Indirect) on Native Vegetation

Image Source: Nearmap (2021) Data source: Umwelt (2019); DevCore (2021); NSW DSFI (2021)



Legend

- Project Area
- Little Eagle 300m Buffer
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3
- Little Eagle 300m Buffer
- Potential Little Eagle Nest
- Indirect Impacts on Little Eagle

Direct Impacts on Little Eagle Vegetation

- Zone 1 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 2 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- Zone 3 PCT1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

FIGURE 5-2

Impacts (Direct and Indirect) on Little Eagle

Image Source: Nearmap (2021) Data source: Umwelt (2019); DevCore (2021); NSW DSFI (2021)

5.1.3 Loss of Vegetation Integrity

The future value of vegetation integrity scores for vegetation zones in the Development Footprint after direct impact was estimated with the assumption that all native vegetation and habitat features would be removed are presented in **Table 5.3**.

Table 5.3 Change in vegetation integrity for the vegetation zones

Veg Zone	PCT ID *Condition Class*	Plot data	Current Vegetation Integrity (VI) Score	Direct Impacts		
				Area (ha)	Future VI	Change in VI
1	PCT1330 *Moderate/ High (Native Woodland)*	1330.1.4	46.4	Stage 1 -0.47 Stage 2 – 0.24 Stage 3 – 0.00	0	**-46.4**
2	PCT1330 *Moderate/ High (Native Derived Grassland*	1330.2.3 1330.2.4	31.2	Stage 1 - 0.24 Stage 2 – 2.12 Stage 3 – 0.32	0	**-30.2**
3	PCT1330 *Low (Native Derived Grassland*	1330.3.1 1330.3.2 1330.3.3	17	Stage 1 – 4.44 Stage 2 - 2.78 Stage 3 – 0.03	0	**-17**

Vegetation integrity loss direct impact on the habitat conditions for Little Eagle was assessed by the change in the vegetation integrity score for each vegetation zone within the species polygon. Loss of habitat condition is summarised in **Table 5.4**.

Table 5.4 Change in habitat condition (vegetation integrity) for Little Eagle

Veg Zone	Current Vegetation Integrity (VI) Score	Direct Impacts		
		Area (ha)	Future VI	Change in VI
1	46.4	Stage 1 - 0.47 Stage 2 – 0.24 Stage 3 – 0.00	0	**-46.4**
2	31.2	Stage 1 - 0.12 Stage 2 – 1.59 Stage 3 – 0.31	0	**-30.2**
3	17	Stage 1 – 3.00 Stage 2 – 1.63 Stage 3 – 0.02	0	**-17**

5.2 Prescribed Impacts

This section identifies prescribed biodiversity impacts on threatened species and ecological communities relevant to the project in accordance with Section 8.3 of the BAM. Prescribed impacts are additional to other impacts associated with the clearing of vegetation and habitat.

An assessment of the potential for prescribed impacts is provided in **Table 5.5**. There is potential for one prescribed impact to occur as a result of the Project and is discussed in further detail in **Section 5.2**.

Table 5.5 Prescribed Impacts

Prescribed Impact	Potential for Impact	Justification
Impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, rocks, human-made structures, or non-native vegetation	Yes	The Development Footprint supports 2 small areas of rock outcrops with few loose rocks associated with exposed siltstone and fine-grained sandstone, and prophyritic quartz monzodiorite. Rocky outcrops are isolated and do not occur near waterways. Rock rolling surveys did not detect any threatened fauna species utilising rocky habitats. These rock habitats are unlikely to support threatened reptiles including Striped Legless Lizard and Pink-tailed Worm-lizard. However, rocks do support a rocky derived grassland TEC (*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* BC Act and EPBC Act) which provide a microclimate and habitat niche for the occurrence of different plant species and variation in the broader ecological community. The extent of rock outcropping present in the Project Area is mapped in **Figure 3.5**. The 300 m species habitat polygon for the Little Eagle has excluded non-native vegetation.
Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	The Development Footprint has no connectivity to broader intact vegetation patches and is already highly fragmented. Connectivity is unlikely to be impacted by the Project. The Development Footprint is currently in a disturbed condition does not provide substantial movement habitat for terrestrial, arboreal, or aquatic threatened species. Functional connectivity currently exists for ground and flying animals that can traverse a cleared and rural landscape. The Vegetation Zone 1 woodland patch would become mostly surrounded by urban housing and provide connectivity for mobile species capable of flying large distances between habitat patches through a peri-urban landscape.
Impacts on movement of threatened species that maintains their life cycle	No	The habitat present in the Development Footprint is not likely to be of significance to the overall lifecycle of any threatened species. The life cycle of threatened birds and Grey-headed Flying-fox with potential foraging habitat in remaining patches are unlikely to be affected by barriers created by the project. The project would create a major barrier for the movement of common fauna and likely affect their life cycle, including ground mammals, reptiles, and frogs.

Prescribed Impact	Potential for Impact	Justification
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	No	The project has the potential to change soil and water quality and increase erosion and sedimentation on-site and into downstream waterways as a result of vegetation clearing and bulk earthworks. The project is unlikely to impact water quality, water bodies and hydrological processes that sustain threatened species. Measures to mitigate increased run-off and impacts on water flow and water quality would reduce the likelihood of impacts on downstream aquatic environments, including the Wollondilly River.
Impacts of wind turbine strikes on protected animals	No	The impacts of wind turbines are not applicable to this Project.
Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	No	Access roads would be within the urban development footprint and would not bisect areas of native vegetation or habitat for threatened species. Common ground mammals that are part of the TEC are most at risk of vehicle strike, especially Eastern Grey Kangaroo. Any installed fencing would create a barrier for animals it would reduce impacts of vehicle strike, particularly in areas along the edge of retained vegetation.

Small isolated rocky outcrops occur in the Development Footprint in derived grassland of Vegetation Zone 2 and Vegetation Zone 3 which are typically very small (<200 m^2) and consist of deeply embedded rocks, with very few loose stones. The dominant grass comprises *Austrostipa* spp. and *Rytidosperma* spp. Rocky outcrops are isolated and do not occur near waterways. An opportunistic rock-rolling survey of surface rocks and targeted tile surveys was completed to search for threatened reptiles in 2015 by NGH (2017), and no threatened species were detected.

While the rocks do support a rocky derived grassland meeting criteria for classification as TEC (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland BC Act and EPBC Act) and provide a microclimate and habitat niche for the occurrence of different plant species and variation in the broader ecological community, they do not support any ecological communities dependent on rocky habitats. Removal of this rocky habitat is therefore unlikely to impact threatened reptiles and does not remove habitat important for persistence of any TECs. Clearing of the rocky habitat would remove habitat for common native flora and fauna, potentially resulting localised reduction of the overall species diversity, ecosystem function and integrity in the landscape. This impact has been quantified in terms of change in vegetation integrity for Zone 2 and Zone 3 presented in **Section 5.1.3**. The scale of impact would comprise the loss of (<200 m^2) of rocky habitat within the current TEC and result in the loss of 30.2 VI in Vegetation Zone 2 and 17 VI in Vegetation Zone 3.

Due to the absence of threatened species, or dependent ecological communities, the potential for prescribed impacts associated with clearing rocky habitat are minimal.

A total of 5.64 ha of non-native vegetation (i.e., exotic grassland) is present within the 300 m species polygon for the Little Eagle. The non-native vegetation was excluded from the polygon as this would be considered as foraging habitat and not breeding habitat. Non-native vegetation is unlikely to provide habitat for the fledglings. As the Development Footprint is surrounded by agricultural lands and would likely comprise of exotic vegetation, it is unlikely that the removal of the exotic vegetation within the Development Footprint would affect the foraging habitat for the Little Eagle within the landscape. As such, non-native vegetation was excluded from the species polygon and was not considered a candidate area for prescribed impact.

6.0 Serious and Irreversible Impacts

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles prescribed in the BC Regulation. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These are impacts that:

- will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is a candidate entity for serious and irreversible impact (SAII) which meets two principles in the *Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact* (DPIE 2019b) and listed on the serious and irreversible webpage (DPIE 2019c). No other potential candidates for SAII are likely to be present in the Project Area.

The consent authority is to determine whether an impact will be serious or irreversible. Thresholds will be one of the factors that the consent authority will consider, alongside the information provided in determining whether a serious and irreversible impact is likely to occur summarised in **Table 6.1**. Impact thresholds have not yet been assigned to any threatened ecological communities, in which case the consent authority can disregard and determine a decision based on the information provided.

The extent of the NSW listed CEEC in the Project Area was confirmed by mapping PCT1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion in the Project Area and is mapped in **Figure 3.4**.

The following additional information sources have been considered in collating this information:

- NSW Threatened Species Scientific Committee Notice of and reason for the Final Determination to list White Box – Yellow Box –Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions as a critically endangered ecological community (NSW TSSC, 2020)
- DECCW 2010. National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- NSW Threatened Species Scientific Committee (NSW TSSC) 2019a. Conservation Assessment of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland

- NSW Threatened Species Scientific Committee (NSW TSSC) 2019b. Preliminary Determination to support a proposal to list White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions as a Critically Endangered Ecological Community in Part 1 of Schedule 2 of the Act

- Threatened Species Scientific Committee (TSSC) 2006. Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Table 6.1 Information to assist the determination of serious and irreversible impacts on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Requirement	Response
a. the action and measures taken to avoid the direct and indirect impacts	The action involves a subdivision and enabling works at Mount Mary Road, Goulburn, for future residential development. For assessment purposes, it has been assumed that all the NSW listed CEEC with native vegetation comprising derived native grassland and regenerating woodland within the Development Footprint would be directly cleared (i.e., 9.93 ha). Only a small area (i.e., 0.71 ha) of woodland supporting remnant or regenerating canopy species would be cleared. The project would avoid 8.63 ha of the listed CEEC in the Project Area. This includes 5.74 ha of woodland (Zone 1), with thirty one hollow-bearing trees, and 2.89 ha of derived grassland (Zone 2 and 3). Direct impacts would avoid all hollowing bearing trees and the Little Eagle stick nest within the retained CEEC. Indirect impacts on the NSW listed CEEC would be minimised by applying the following specific measures: • Erection of signage and exclusion fencing to prevent vehicle access into the CEEC patch during construction and on a permanent basis during the residential operation of the site. This would also reduce rubbish dumping and wood collection. It has been recommended that this measure be outlined in the CEMP. • Preparation and implementation of an Erosion and Sediment Control Plan during the construction phase in a site-specific CEMP to ensure that adjacent CEEC patches are not adversely impacted by overland surface water flows or sediment movement from the construction site, particularly in the upslope northeast of the Development Footprint. • Implementation of weed management controls during the construction phase, to mitigate the risk of introduction of invasive weeds to the Development Footprint and prevent spread into adjacent CEEC patch. • Management of pest or feral species where required and implementation and enforcement of a cat containment area. Further details of measures used to avoid and minimise impacts are presented in **Section 4.0**. This assessment applies to the Project Area which the DA applies.
b. the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone	For assessment purposes, it has been assumed that all the NSW listed CEEC within the Development Footprint would be directly cleared (i.e., 10.65 ha) within 3 vegetation zones: • Vegetation Zone 1: 0.71 ha (Moderate/High-Native Woodland) • Vegetation Zone 2: 0.68 ha (Moderate/High-Native Derived Grassland) • Vegetation Zone 3: 7.26 ha (Low-Native Derived Grassland). Ten assessment plots were completed in the Development Footprint to measure vegetation integrity of woodland and derived grassland in three vegetation zones. A loss of vegetation integrity (VI) for each vegetation zone includes the following: • Vegetation Zone 1 = 46.4 • Vegetation Zone 2 = 30.2

Requirement	Response
	• Vegetation Zone 3 = 17. Vegetation Zone 1 comprised a native groundcover, mostly dominated with grasses, sparse shrub layer and mostly moderately modified overstorey with areas of large mature trees and regenerating trees. Composition condition scored 42.7 and structure condition scored 60.1. Some small trees and numerous tree regeneration would be removed, including *E. blakelyi* and *E. melliodora*. There was a moderate abundance of weeds with a high threat weed cover of 1.4%. The function condition scored 38.9, however, no large trees or hollow-bearing trees will be impacted. Vegetation Zone 2 comprised a moderately modified groundcover dominated by *T. triandra*, *Austrostipa* spp. and *Rytidosperma* spp. and a range of native forbs. Composition condition scored 36.7 and the structure condition scored 52.1. There was a moderate abundance of weeds with a high threat weed cover of 1.1%. Function condition attributes were absent except litter cover which scored 15. Some marginal surface rock habitat in this zone would also be impacted. Vegetation Zone 3 mostly comprised *B. macra* and *T. triandra,* with a low abundance of native forbs. Composition condition scored 13.3 and the structure condition scored 50.8. There was a moderate abundance of weeds with an average high threat weed cover of 3.5%. Function condition attributes were absent except litter cover which scored 7.3. All vegetation zones have experienced varying levels of modification through past land use such as land clearing and grazing, and possible pasture improvement on the lower slopes. This has modified the structural complexity, introduced weeds, and created patch fragmentation/isolation. The severity of habitat degradation and fragmentation in the landscape, as well as patch isolation, vegetation structural changes and past grazing, lowers the likelihood of some threatened fauna occurring in the Project Area. It has been anticipated that a further 5.06 ha (assessed using a 50 m buffer) of retained CEEC would be potentially impacted by edge effects (indirectly) such as noise, dust, light, illegal vehicle access, rubbish dumping, illegal wood collection, and spread of weeds and pests. The project may indirectly impact a total of 5.06 ha of listed CEEC (**Figure 5.1**): • Vegetation Zone 1: 2.58 ha • Vegetation Zone 2: 2.06 ha • Vegetation Zone 3: 0.42 ha The project would retain 8.63 ha of the listed CEEC in the Project Area. This includes 5.74 ha of woodland (Zone 1) and 2.89 ha of derived grassland (Zone 2 and 3). Direct impacts would avoid all hollowing bearing trees and stick nests within the retained CEEC. Assuming implementation of the proposed mitigation measures, indirect impacts to the remaining CEEC patch are likely to be negligible. Increased fragmentation and patch isolation are unlikely to further degrade or reduce vegetation integrity.

Requirement	Response
c. the extent to which the impact exceeds any threshold for the potential entity that is specified in the *Guidance and criteria to assist a decision-maker to determine a serious and irreversible impact* a description of the extent to which the impact exceeds the threshold for the potential entity	Impact thresholds have not yet been assigned to any threatened ecological communities. The consent authority will need to make a judgement from other assessments of criteria for the NSW listed CEEC. The total area of CEEC comprises 19.28 ha in the Project Area. Of this, 10.65 ha would be impacted within the Development Footprint. This would result in the clearing of 55% of the CEEC patch within the Project Area. However, the majority of the structural woodland, including high value large mature trees, and most of the moderate to good condition derived native grassland would be avoided. Most of the native vegetation and CEEC to be cleared is limited to derived grassland and a small portion of Vegetation Zone 1 woodland which support small regenerating trees.
d. the extent and overall condition of the potential TEC within an area of 1000 ha, and then 10,000 ha, surrounding the proposed development footprint	It is estimated that less than 5% of this CEEC remains in good condition with most of this remaining in small, isolated patches (Department of the Environment and Heritage, 2006). Many intact remnants lack an overstorey due to the clearing of trees and retain a highly diverse groundcover dominated by native plant species. However, these patches are extremely rare and very small (Prober & Thiele 1995). These patches can generally be rehabilitated with assisted regeneration if groundcover can resist weed invasion. Areas with high densities of Kangaroo Grass (*T. triandra*), of which are present in the Development Footprint can suppress invasive exotic perennial grass species (Cole et al. 2004). Spatial analysis of vegetation mapping data sourced from *SouthCoast_SCIVI_v14* (Tozer et al, 2010) was undertaken to calculate the extent of the NSW listed CEEC in the broader landscape. Mapped vegetation units, GW p24: Tableland Grassy Box-Gum Woodland (Tozer et al, 2010) matching the CEEC were used to estimate the extent of the vegetation. Much of map unit GW p24 has been extensively cleared for agriculture, therefore it has been assumed that remaining remnants are disturbed and continue to be disturbed from small-scale clearing, overgrazing, and weed invasion (Tozer et al. 2010). Within an area of 1,000 ha the estimated extent of the remaining CEEC surrounding the proposed Development Footprint is estimated to be 51.14 ha, which equates to 5.1% of the extent of the remaining CEEC. Due to the scale of the regional mapping used (Tozer et al. 2010), this estimate is likely to underestimate the extent of derived native grasslands in cleared agricultural areas similar to the Development Footprint. Within an area of 10,000 ha the estimated extent of remaining CEEC surrounding the proposed Development Footprint is estimated to be 211.57 ha, which equates to 2.1% of the extent of the remaining CEEC. As discussed above, the extent of derived native grasslands is likely to be underestimated.

Requirement	Response
e. an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	Less than 5% of the original distribution of this community remains in NSW, and much of this has suffered compositional changes associated with differential management practices and exposure to livestock grazing and rabbit damage. (Prober and Thiele 2004; Keith 2004). In the period of 2009-2018, the average area of Grassy Woodland cleared by agriculture and infrastructure was 739 ha per year. In the years 2016-2018, clearing of Grassy Woodland rose to an average of 1402 ha per year compared to an average of 550 ha per year in previous years (2009-2016) (OEH, 2018b; NSW, TSSC, 2019a). The best estimate of the area of occupancy (AoO) for this CEEC is 151,100 km^2 (Tozer, Simpson & NSW Threatened Species Scientific Committee, 2019). There is circumstantial evidence which suggests that clearing of this CEEC is ongoing and has increased in recent years, particularly in NSW which accounts for three quarters of the distribution of the CEEC. Clearing is likely to continue at least in the short term in NSW under the current regulatory framework, (NSW Threatened Species Scientific Committee, 2019) The NSW Threatened Species Scientific Committee (2019) states that the CEEC continues to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the total destruction of all elements of the CEEC, threatens it with extinction. The reduction in the integrity of this CEEC across most of its range has been very severe and is unlikely to be re-established. Spatial analysis of vegetation mapping data sourced from FE_CRA_STHN_REVISED05_E_3858 (Gellie, 2005), *SouthCoast_SCIVI_v14* (Tozer et al, 2010) and the Ecological Communities of National Environmental Significance Database (DoEE, 2018) was undertaken to calculate the extent of the NSW listed CEEC in the Monaro Subregion. Within the Monaro subregion (including within the Project Area), the estimated extent of remaining CEEC (condition unknown), is 18,163 ha. After the impact of the proposed development, there will be 18,152 ha remaining in the Monaro subregion. This equates to a loss of 0.05% within the subregion. However, due to currently available vegetation mapping, this estimate is likely to be an overestimate as derived native grassland is likely to be underestimated.
f. an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	Spatial analysis of vegetation mapping data sourced from FE_CRA_STHN_REVISED05_E_3858 (Gellie, 2005), *SouthCoast_SCIVI_v14* (Tozer et al. 2010) and the Ecological Communities of National Environmental Significance Database (DoEE, 2018) and State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778, (OEH, 2019d) was undertaken to calculate the extent of the NSW listed CEEC in the reserve system within the Monaro subregion and South Eastern Highlands region. There is an estimated 1,151 ha of the candidate CEEC in the reserve system within the Monaro subregion. There is an estimated 20,706 ha of the candidate CEEC in the reserve system within the South-eastern Highlands region.
g. the development, clearing or biodiversity certification proposal's impact on: i. abiotic factors critical to the long-term survival of the	The Project is anticipated to result in the loss of 10.65 ha of the CEEC within the Development Footprint. Most indirect impacts are likely to be negligible once managed through the mitigation measures.

Requirement	Response
potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	i. Impacts on abiotic factors critical to the survival of the CEEC associated with the Project are limited to the potential of altered hydrology occurring from construction in the north east of the Development Footprint (upslope of the CEEC patch) may increase overland surface water flows or sediment movement which could run off into the retained CEEC patch and remove topsoil. Implementation of a site-specific Erosion and Sediment Control Plan during the construction phase would minimise these effects. Loss of the rocky habitat would also remove a small proportion of plant species variation and habitat diversity and availability in the derived grassland CEEC (Zone 2). This would reduce the overall species diversity, ecosystem function and integrity in the landscape. ii. The Project would remove 10.65 ha of CEEC supporting important species (defined by TSSC,2006). Eight important plant species would be impacted by removal of understorey plants, including *T. triandra*, *Calocephalus citreus, Chrysocephalum apiculatum, Chrysocephalum semipapposum, Eryngium ovinum, Goodenia hederacea, Goodenia pinnatifida* and *Tricoryne elatior*. These species vary in abundance and are most common in derived grassland (Zones 2 and 3). iii. The current CEEC patch is small, isolated, and moderately degraded. There is potential for increased weed invasion. However, under the current disturbance (grazing) regime, changes to the quality and integrity of the patch are likely to be negligible. The patch already experiences edge effects in the landscape. The project is unlikely to alter the availability of food for invasive flora and fauna. The project has sought to avoid and minimise these impacts where feasible (refer to **Section 4.1** and **Section 4.2**).

Requirement	Response
h. direct or indirect fragmentation and isolation of an important area of the potential TEC	The existing CEEC patch is already isolated in a highly fragmented landscape surrounded by urban development and cleared agricultural land. The site has been modified from land clearing, grazing, and weed invasion. The CEEC patch has sustained habitat degradation with a loss of trees and substantial changes in vegetation structure. As a whole, the importance of the CEEC patch is restricted to areas with hollow-bearing trees in Vegetation Zone 1 and good native species richness in the groundcover of Vegetation Zones 2 and 3 combined. All hollow-bearing trees would be avoided by the project and retained in the patch. The patch has good regeneration potential, and the derived grassland would respond well to rehabilitation. However, the patch would remain fragmented in the landscape. Of the remaining biodiversity values, habitat connectivity is unlikely to be indirectly fragmented which currently provides movement for fauna species able to move through a cleared and rural landscape. The Vegetation Zone 1 woodland patch would become surrounded by urban housing and provide connectivity for mobile species capable of flying large distances between habitat patches through a peri-urban landscape. Overall, given the small size and isolation of the patch in the landscape, the project would not cause further direct or indirect fragmentation and isolation of the CEEC.
i. the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	The Project would enter the Biodiversity Offsets Scheme (BOS) to meet biodiversity offset obligations for residual impacts.

7.0 Biodiversity Credit Impact Summary

7.1 Impacts Not Requiring Assessment

Under the BAM, impacts on areas of land without native vegetation do not require further assessment, unless prescribed impacts are present.

The Development Footprint supports 19.78 ha of land which is classified as non-native vegetation based on the results of floristic sampling and plot-based analyses presented in **Section 3.0**. Therefore, impacts to 19.78 ha of vegetation on land within the Development Footprint identified as "*Exotic Vegetation"* does not require assessment under the BAM. Impacts to 10.65 ha of land which is classified as native vegetation require assessment under the BAM.

7.2 Impacts Not Requiring Offset

Impacts on native vegetation not requiring offsets under the BAM include native vegetation that has a vegetation integrity score of less than 20 (where it is not associated with ecosystem-credit species habitat or a TEC), less than 17 (where it is associated with ecosystem-credit habitat or a VEC) or less than 15 (where it is representative of an EEC or CEEC). Vegetation Zone 3 comprising derived native grassland in low condition identified within the Development Footprint has a vegetation integrity score of 17 and is above the threshold for a TEC (**Table 5.3**). Therefore, all native vegetation in the Development Footprint requires offsetting under the BAM.

Native vegetation indirectly impacted assessed in this BDAR does not require offset.

7.3 Impacts Requiring Offset

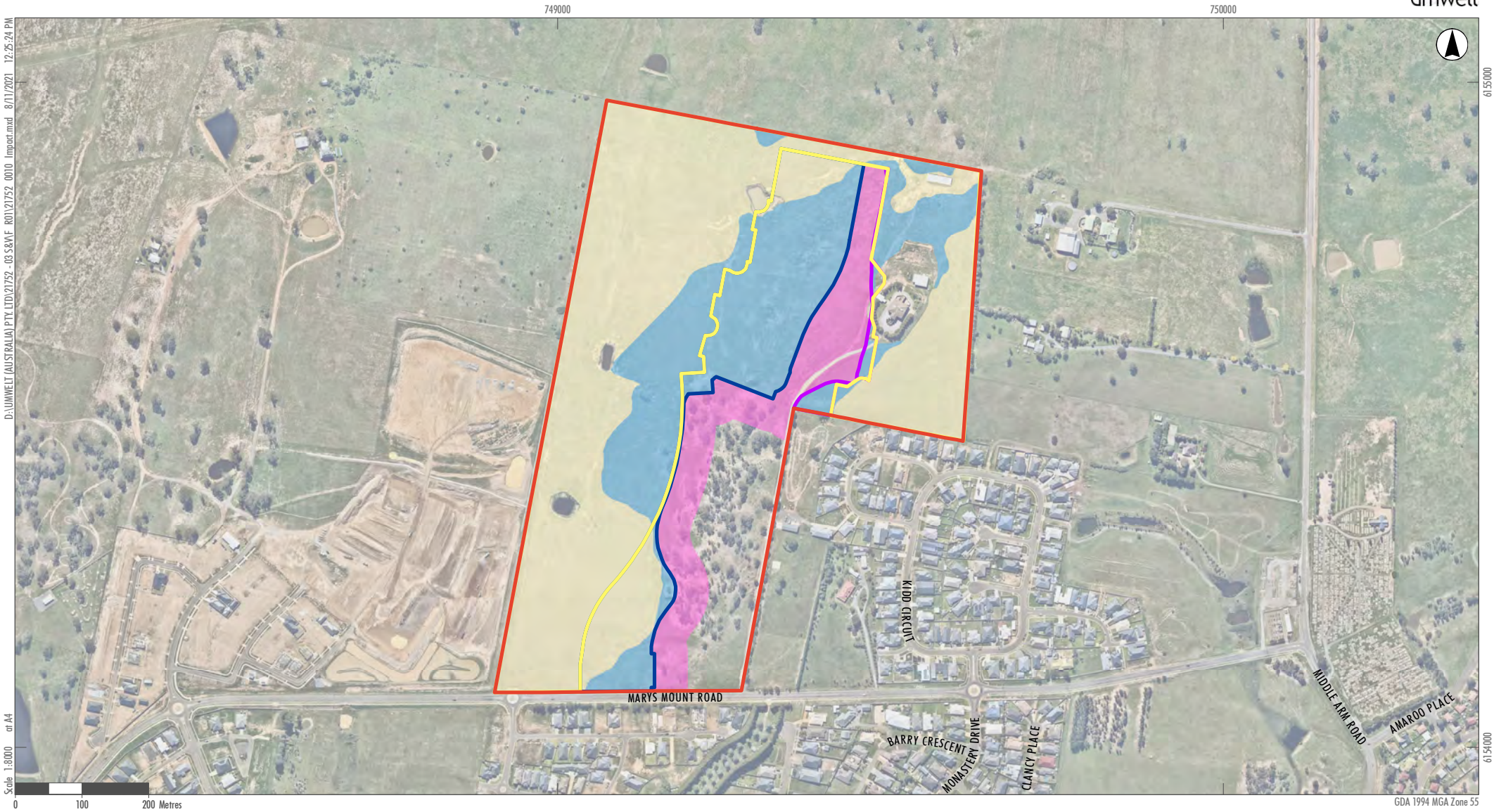
Three native vegetation zones and one species credit species habitat polygons require offsetting in accordance with the BAM (DPIE, 2020) and are summarised in **Table 7.1**. Each development stage has been separated in the BAM-C in order to identify the number of credits required.

Figure 7.1 illustrates all areas requiring offsets, not requiring offsets, and also not requiring assessment.

Table 7.1 Impacts Requiring Offset

Veg Zone	PCT/Species-credit	Vegetation Integrity Score / Habitat Condition			Area (ha)	Credits Required
		Current	Future	Change		
Native Vegtation						
Stage 1 Development						
1	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	46.4	0	-46.4	0.47	14
2		30.1	0	-30.2	0.24	5
3		17	0	-17	4.44	47
Stage 2 Development						
1	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	46.4	0	-46.4	0.24	7
2		30.1	0	-30.2	2.11	40
3		17	0	-17	2.79	30
Stage 3 Development						
1	1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	46.4	0	-46.4	0.00	0
2		30.1	0	-30.2	0.32	6
3		17	0	-17	0.03	1
Little Eagle						
Stage 1 Development						
1	Little Eagle	46.4	0	-46.4	0.47	8
2		30.1	0	-30.2	3.00	19
3		17	0	-17	0.12	1
Stage 2 Development						
1	Little Eagle	46.4	0	-46.4	0.24	4
2		30.1	0	-30.2	1.60	10
3		17	0	-17	1.60	18
Stage 3 Development						
1	Little Eagle	46.4	0	-46.4	0.00	0
2		30.1	0	-30.2	0.02	1
3		17	0	-17	0.31	4
Total area and number of Ecosystem Credits					**10.65**	**150**
Total area and number of Species Credits					**7.4**	**65**

*Area numbers rounded to two decimal place to calculate biodiversity credits.



Legend

- Project Area
- Disturbance Footprint - Stage 1
- Disturbance Footprint - Stage 2
- Disturbance Footprint - Stage 3

Impact Summary

- Areas Impact Required Offset (Native Vegetation)
- Areas not requiring Assessment (Exotic Vegetation)
- Areas Impact Not Requiring Offsets (Indirect Impacts)

FIGURE 7-1

Impact Summary

Image Source: Nearmap (2021) Data source: Capital Ecology (2019); Umwelt (2019); DevCore (2021); NSW DSFI (2021)

8.0 Biodiversity Credit Report

The full Biodiversity Credit Report is included in **Appendix C**.

A summary of the number and class of biodiversity credits to be retired for each of the staged development and the total credits required is presented in **Table 8.1**. Hollow-bearing trees will not be impacted in the Development Footprint, therefore offset obligations do not require ecosystem credits with hollow-bearing trees. The like for like options identify the types of offsets that can be used to meet an offset obligation under the Biodiversity Offsets Scheme ('Like for Like' Rules).

Table 8.1 Ecosystem and Species Credits required at the Development Footprint

Name	Like for like credit retirement options	Credits Stage 1	Credits Stage 2	Credits Stage 3	Total Credits
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Any PCT that conforms to the threatened ecological community in the same or adjoining IBRA subregions, including: Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Murrumbateman, Snowy Mountains and South East Coastal Ranges. OR Any IBRA subregion that is within 100 km of the outer edge of the impacted site. The threatened ecological community contains no impacts to hollow bearing trees and does not require vegetation that contains hollow bearing trees at an offset site. **Variation options:** If an applicant can show that they have taken all reasonable steps within the minimum timeframe to obtain like-for-like credits, the consent authority may approve the use of the variation rules. Variation rules apply to the retirement of: A vegetation formation in the same or higher offset trading group in the same IBRA region OR Any IBRA subregion that is within 100 km of the outer edge of the impacted site.	**66**	**77**	**7**	**150**
Little Eagle	Anywhere in NSW. **Variation options:** If an applicant can show that they have taken all reasonable steps within the minimum timeframe to obtain like-for-like credits, the consent authority may approve the use of the variation rules. Any species with same or higher category of vulnerable listing under Part 4 of the BC Act can be used as an offset under the variation rules.	**28**	**32**	**5**	**65**

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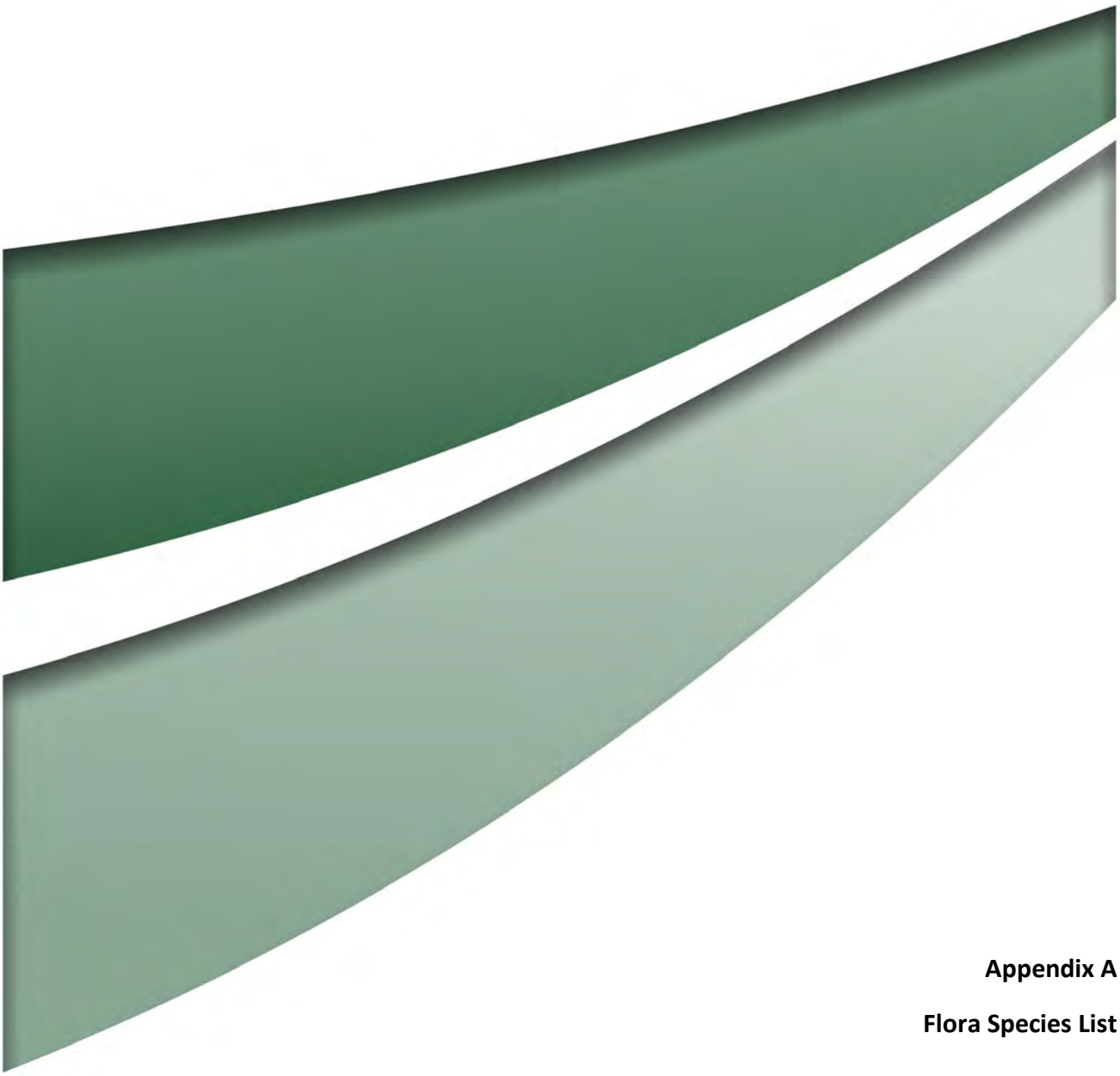


Appendix A

Flora Species List

Flora Species List

The following list shown was developed from surveys of the Development Site by Umwelt and Capital Ecology in 2018-2021 It includes all species of vascular plants observed during these surveys. It is acknowledged that the list is not comprehensive, as not all species are readily detected at any one time of the year. Many species flower only during restricted periods of the year, and some flower only once in several years. In the absence of flowering material, many of these species cannot be identified, or even detected.

Names of classes and families follow a modified Cronquist (1981) System.

Any species that could not be identified to the lowest taxonomic level are denoted in the following manner:

- sp. specimens that are identified to genus level only.

The following abbreviations or symbols are used in the list:

- asterisk (*) denotes species non-native species;
- subsp. subspecies; and
- var. variety.

All vascular plants recorded or collected were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002) and Wheeler et al. (2002). Where known, changes to nomenclature and classification have been incorporated into the results, as derived from PlantNET (Botanic Gardens Trust 2018), the on-line plant name database maintained by the National Herbarium of New South Wales.

Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

Table A-1 Flora Species list

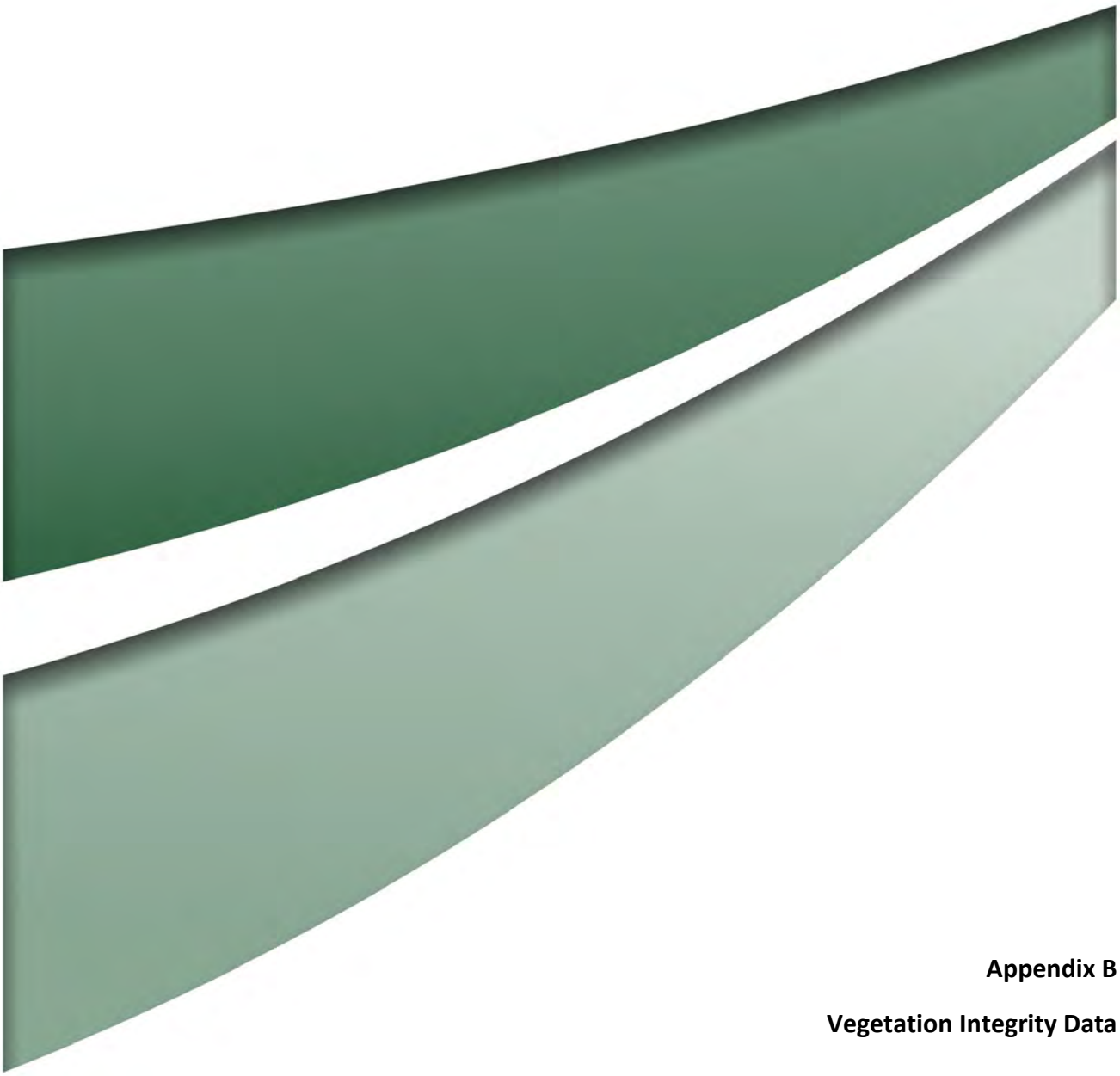
Family	Scientific Name	Common Name	Zone 1				Zone 2				Zone 3			Zone 4			
			1330.1.1	1330.1.2	1330.1.3	1330.1.4	1330.2.1	1330.2.2	1330.2.3	1330.2.4	1330.3.1	1330.3.2	1330.3.3	1330.4.1	1330.4.2	1330.4.3	1330.4.4
Anthericaceae	*Tricoryne elatior*	Yellow Autumn-lily							0.1								
Apiaceae	*Eryngium ovinum*	Blue Devil (Opportunistic)															
Asteraceae	*Arctotheca calendula**	Cape Weed			0.1			0.1			0.1	0.1	0.1				
Asteraceae	*Calocephalus citreus*	Lemon Beauty-heads						0.1	2.0								
Asteraceae	*Carthamus lanatus**	Saffron Thistle					0.5										
Asteraceae	*Cassinia aculeata*	Common Cassinia	0.1						0.1	0.1							
Asteraceae	*Chrysocephalum apiculatum*	Common Everlasting	0.1			1			2.0	5	0.2		2	0.1		0.1	
Asteraceae	*Chrysocephalum semipapposum*	Clustered Everlasting					0.2	0.3									
Asteraceae	*Conyza* sp.	Fleabane				0.1							0.1				
Asteraceae	*Euchiton sphaericus*					0.2			0.1	0.3			0.1				0.2
Asteraceae	*Gamochaeta purpurea**	Purple Cudweed				0.1	0.1	0.1	0.1				0.1		0.1	0.1	0.1
Asteraceae	*Hypochaeris glabra**	Smooth Catsear						0.2				0.0			0.1		
Asteraceae	*Hypochaeris radicata**	Catsear	0.1			0.4	1.0	0.5	1.0	0.4	0.2	0.5	0.2	0.5	0.5	0.5	0.1
Asteraceae	*Lactuca serriola*	Prickly Lettuce											0.1				
Asteraceae	*Onopordum acanthium*	Scotch Thistle				0.1											
Asteraceae	*Vittadinia muelleri*	Fuzzweed								0.5							
Boraginaceae	*Cynoglossum suaveolens*	Sweet Hound's Tongue					0.1										
Brassicaceae	*Hirschfeldia incana**	Hairy Brassica					0.1										
Brassicaceae	*Lepidium* sp.*	Peppercress				0.5											

Family	Scientific Name	Common Name	Zone 1				Zone 2				Zone 3			Zone 4			
			1330.1.1	1330.1.2	1330.1.3	1330.1.4	1330.2.1	1330.2.2	1330.2.3	1330.2.4	1330.3.1	1330.3.2	1330.3.3	1330.4.1	1330.4.2	1330.4.3	1330.4.4
Campanulaceae	*Wahlenbergia luteola*	Yellowish Bluebell		0.1		0.1	0.1		0.1	0.1		0.1		0.1			
Caryophyllaceae	*Paronychia brasiliana**	Chilean Whitlow Wort		0.1	0.1	0.1	0.1			0.1							
Caryophyllaceae	*Petrorhagia nanteuilii**	Childling Pink						0.1		0.2							
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	0.1	0.1	0.1	0.2											
Convolvulaceae	*Convolvulus erubescens*	Blushing Bindweed					0.1										
Crassulaceae	*Crassula sieberiana*	Australian Stonecrop											0.1				
Cyperaceae	*Carex inversa*					0.1											
Ericaceae	*Lissanthe strigose*	Peach Heath	0.2	0.1				0.1	0.1	1		0.1					
Euphorbiaceae	*Euphorbia drummondii*									0.1							
Fabaceae	*Trifolium arvense**					0.1											
Fabaceae	*Trifolium sp.**	Clover						0.2				0.2					
Gentianaceae	*Centaurium erythraea*	Common Centaury											0.1				
Geraniaceae	*Erodium cicutarium**	Common Storksbill									0.1	0.1			0.1		0.1
Goodeniaceae	*Goodenia hederacea*	Forest Goodenia		0.1													
Goodeniaceae	*Goodenia pinnatifida*	Scrambled Eggs			0.1		0.1				0.1						
Haloragaceae	*Haloragis heterophylla*					0.1											
Hypericaceae	*Hypericum perforatum**	St John's Wort				0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.3	0.1		0.1	0.1
Juncaceae	*Juncus australis*	Austral Rush															0.1
Juncaceae	*Juncus filicaulis*	Thread Rush							0.1						0.1		0.1
Lamiaceae	*Salvia verbenaca**					0.1											

Family	Scientific Name	Common Name	Zone 1				Zone 2				Zone 3			Zone 4			
			1330.1.1	1330.1.2	1330.1.3	1330.1.4	1330.2.1	1330.2.2	1330.2.3	1330.2.4	1330.3.1	1330.3.2	1330.3.3	1330.4.1	1330.4.2	1330.4.3	1330.4.4
Lomandraceae	*Lomandra filiformis* subsp. *coriacea*		2.0	3.0		0.2		2.0	0.3	0.4		0.2					
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush		0.1		0.3		0.1	0.1	0.1	0.1	0.1					
Malvaceae	*Malus* sp.*					0.1											
Malvaceae	*Modiola caroliniana**					0.2											
Myrsinaceae	*Lysimachia arvensis**					0.1											
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	10.0	3.0	5.0	30											
Myrtaceae	*Eucalyptus melliodora*	Yellow Box		10.0	5.0	3											
Myrtaceae	*Eucalyptus pauciflora*	Snow Gum		7.0													
Myrtaceae	*Eucalyptus viminalis*	Candlebark (Opportunistic)															
Oxalidaceae	*Oxalis perennans*	Grassland Wood-sorrel	0.1		0.1	0.1	0.1		0.1	0.1		0.1	0.1	0.1			0.1
Plantaginaceae	*Plantago lanceolata**	Lamb's Tongues	0.2	0.5	0.2	25	0.2			0.3	0.5	0.5	0.2	0.1			0.3
Poaceae	*Aira* sp.*	Hair-grass		0.1											0.1		
Poaceae	*Aristida ramosa*									2							
Poaceae	*Austrostipa bigeniculata*	Doublejointed Speargrass	10.0	15.0	10.0	2	20.0			60		30.0					0.2
Poaceae	*Austrostipa densiflora*	Foxtail Speargrass													1.0		
Poaceae	*Austrostipa scabra*	Speargrass	5.0	5.0	10.0			5.0	1.0	0.2		10.0					
Poaceae	*Bothriochloa macra*	Red Grass	0.2			2	5.0	10.0	5.0	0.1		10.0	70	10.0	3.0	3.0	5.0
Poaceae	*Briza minor*	Quaking Grass															
Poaceae	*Bromus hordeaceus**	Soft Brome			0.1	0.2					0.2		0.2	0.5	1.0		
Poaceae	*Chloris truncata*	Windmill Grass				0.1			0.5				0.5				

Family	Scientific Name	Common Name	Zone 1				Zone 2				Zone 3			Zone 4			
			1330.1.1	1330.1.2	1330.1.3	1330.1.4	1330.2.1	1330.2.2	1330.2.3	1330.2.4	1330.3.1	1330.3.2	1330.3.3	1330.4.1	1330.4.2	1330.4.3	1330.4.4
Poaceae	*Dactylis glomerata**	Cocksfoot	0.1	0.1	0.2	4	0.5	2.0		0.1	5.0	5.0		40.0	30.0	40.0	70.0
Poaceae	*Digitaria sanguinalis**					0.1											
Poaceae	*Eleusine tristachya**	Goose Grass															0.2
Poaceae	*Elymus scaber*	Common Wheat Grass		0.2			0.1		0.2								0.1
Poaceae	*Enneapogon nigricans*									0.1							
Poaceae	*Eragrostis curvula**	African Lovegrass										0.2					
Poaceae	*Festuca arundinacea**	Tall Fescue									0.1						
Poaceae	*Holcus lanatus**	Yorkshire Fog												0.2			
Poaceae	*Hordeum sp.**	Barley Grass			0.5									0.2			
Poaceae	*Lolium perenne**	Perennial Ryegrass		0.1	0.5		0.1	0.1	0.1		0.5			0.2	2.0		2.0
Poaceae	*Microlaena stipoides*	weeping grass	2.0	0.3			2.0	0.5						0.5			
Poaceae	*Nassella neesiana**	Chilean Needle Grass													15.0	1.0	
Poaceae	*Nassella trichotoma**	Serrated Tussock	5.0	2.0	5.0	0.2	15.0	3.0	1.0	0.5	0.5	5.0	4	20.0	5.0	30.0	0.1
Poaceae	*Panicum effusum*	Hairy Panic		0.1	0.1	0.3		0.2	0.1	1		2.0					
Poaceae	*Paspalum dilatatum**	Paspalum									0.2			0.3	15.0	1.0	
Poaceae	*Rytidosperma carphoides*									0.5							
Poaceae	*Rytidosperma sp.*	Wallaby Grass	0.1	3.0		0.1	5.0	5.0	5.0	0.1	1.0	2.0		1.0			
Poaceae	*Themeda triandra*	Kangaroo Grass	1.0			15	25.0	40.0	40.0		60.0	2.0	6				
Poaceae	*Vulpia sp.**	Fescues	0.2	0.1	0.5	0.3	1.0				1.0	1.0	4	0.5	3.0	0.2	0.5
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel											0.2				

Family	Scientific Name	Common Name	Zone 1				Zone 2				Zone 3			Zone 4			
			1330.1.1	1330.1.2	1330.1.3	1330.1.4	1330.2.1	1330.2.2	1330.2.3	1330.2.4	1330.3.1	1330.3.2	1330.3.3	1330.4.1	1330.4.2	1330.4.3	1330.4.4
Polygonaceae	*Acetosella vulgaris**					0.2											
Polygonaceae	*Rumex brownie*	Swamp Dock					0.1										
Rosaceae	*Rosa rubiginosa**	Sweet Briar	0.1														
Rosaceae	*Rubus fruticosus agg.**	*Blackberry*				1											
Solanaceae	*Lycium ferocissimum**	African Boxthorn	0.1	0.2	5.0	1						0.1	0.1			0.1	



Appendix B

Vegetation Integrity Data

Vegetation Integrity Data

The following vegetation integrity data shown **Table B-1** was collected from surveys of the Development Footprint. It includes the composition, structure and function attributes that are recorded in each BAM plot. This data is assessed against benchmark data for PCTs and entered into the BAM-Cto assess the condition of each PCT in the Development Footprint.

The following abbreviations are used in the table below:

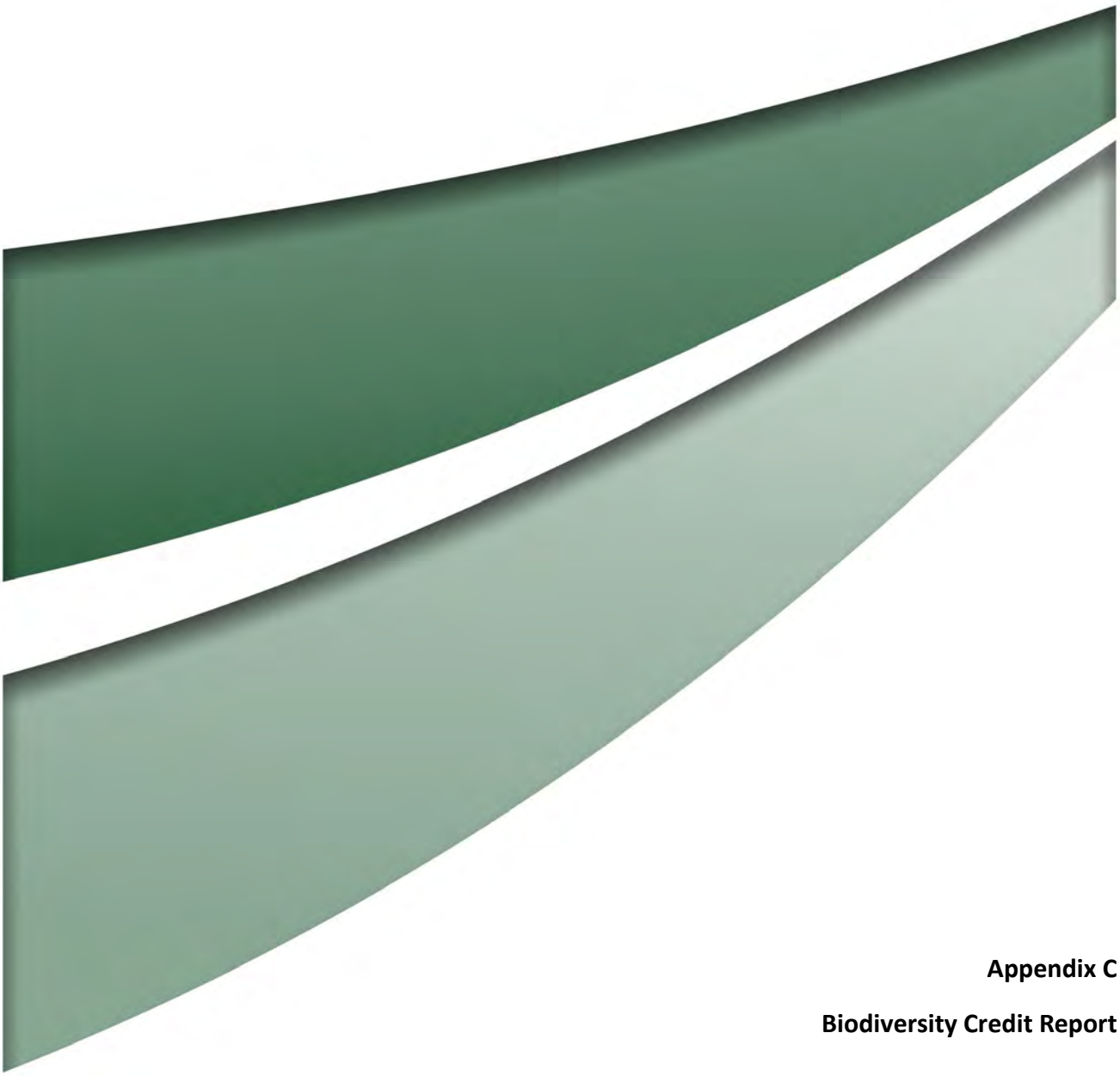
- Tr Tree (growth form)
- Sh Shrub (growth form)
- Gr Grass (growth form)
- Fb Forb (growth form)
- Fn Fern (growth form)
- Ot Other (growth form)

Table B-1 Vegetation Integrity plot data

Plots	Composition*						Structure*						Function+										
	TR	SH	GR	FB	FN	OT	TR	SH	GR	FB	FN	OT	RN	Stem Classes (cm)					LT	HBT	LTT (%)	FLL (m)	HTW
													<5	5-9	10-19	20-29	30-49	50-79					
1330.1.1	2	2	6	1	0	0	15.0	0.3	20.3	0.3	0.0	0.0	1	1	1	1	0	0	1	0	39.0	0.0	5.2
1330.1.2	3	1	6	1	0	0	20.0	0.1	26.7	0.3	0.0	0.0	1	0	0	0	1	1	2	4	51.0	18.0	2.2
1330.1.3	1	0	2	1	0	0	15.0	0.0	20.1	0.3	0.0	0.0	1	0	0	1	1	1	2	3	38.0	15.0	10
1330.1.4	2	0	9	6	0	0	33.0	0.0	19.9	1.7	0.0	0.0	1	0	0	1	1	0	0	0	61.6	0.0	1.4
1330.2.1	0	0	5	2	0	1	0.0	0.0	57.1	0.7	0.0	0.1	0	0	0	0	0	0	0	0	34.0	0.0	15.7
1330.2.2	0	1	7	2	0	0	0.0	0.1	62.8	0.4	0.0	0.0	0	0	0	0	0	0	0	0	14.6	0.0	3.2
1330.2.3	0	1	2	10	6	0	0.0	0.2	52.3	4.4	0.0	0.0	0	0	0	0	0	0	0	0	24.0	0.0	1.1
1330.2.4	0	1	9	5	0	0	0.0	1.0	103.9	6.0	0.0	0.0	0	0	0	0	0	0	0	0	49.0	0.0	0.3
1330.3.1	0	0	3	2	0	0	0.0	0.0	61.1	0.3	0.0	0.0	0	0	0	0	0	0	0	0	29.0	0.0	0.8
1330.3.2	0	1	5	1	0	0	0.0	0.1	56.3	0.2	0.0	0.0	0	0	0	0	0	0	0	0	24.0	0.0	5.4
1330.3.3	0	0	2	4	0	0	0.0	0.0	76	2.3	0.0	0.0	0	0	0	0	0	0	0	0	7.0	0.0	4.4

*TR=Tree, SH=Shrub, GR=Grass and grass like, FB=Forb, FN=Fern, OT=Other

+RN=Regen, LT=Large Trees, HBT=Hollow bearing trees, LTT=Litter, FLL=Fallen Logs, HTW=High Threat Weeds



Appendix C

Biodiversity Credit Report

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00024200/BAAS18043/21/00024201

Proposal Name
DevCore Property Group Marys Mount Road Goulburn NSW

BAM data last updated *
24/11/2021

Assessor Name
Natasha Crook

Assessor Number
BAAS18043

BAM Data version *
50

Proponent Names

Report Created
02/03/2022

BAM Case Status
Finalised

Assessment Revision
10

Assessment Type
Part 4 Developments (General)

Date Finalised
02/03/2022

BOS entry trigger
BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

BAM Biodiversity Credit Report (Like for like)

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami / Glossy Black-Cockatoo
Haliaeetus leucogaster / White-bellied Sea-Eagle

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	10.7	0	150	150

1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347,	-	1330_1Canopy_Ndom_ModHigh	No	14	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	-	1330_1Dgrass_Ndom_ModHigh	No	5	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native	-	1330_1Dgrass_Ndom_Low	No	47	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges.

BAM Biodiversity Credit Report (Like for like)

	Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608,					or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710,	-	1330_2Canopy_Ndom_ModHigh	No	7	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437,	-	1330_2Dgrass_Ndom_ModHigh	No	40	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

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	451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276,	-	1330_2Dgrass_Ndom_Low	No	30	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland,	-	1330_3Dgrass_Ndom_ModHigh	No	6	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the

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	Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					impacted site.
	White Box - Yellow Box -	-	1330_3Dgrass_	No	1	Monaro, Bungonia, Crookwell,

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	Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307,		Ndom_Low			Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

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	1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Hieraaetus morphnoides / Little Eagle	**1330_1Canopy_Ndom_ModHigh, 1330_1Dgrass_Ndom_ModHigh, 1330_1Dgrass_Ndom_Low, 1330_2Canopy_Ndom_ModHigh, 1330_2Dgrass_Ndom_ModHigh, 1330_2Dgrass_Ndom_Low, 1330_3Dgrass_Ndom_ModHigh, 1330_3Dgrass_Ndom_Low**	7.4	65.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Hieraaetus morphnoides / Little Eagle	**Hieraaetus morphnoides /** Little Eagle	Any in NSW

Appendix 7

umwelt
Environmental & Social Consultants

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