SCHOOL INFRASTRUCTURE NSW

AUGUST 2022

JINDABYNE EDUCATION CAMPUS

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

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Jindabyne Education Campus
Biodiversity Development Assessment Report

School Infrastructure NSW

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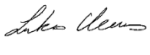
	NAME	DATE	SIGNATURE
Prepared by:	Lukas Clews	03/08/2022	
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GLOSSARY

Accredited person or assessor	A person accredited under section 6.10 of the Biodiversity Conservation Act 2016 to prepare reports in accordance with Biodiversity Assessment Method.
Biodiversity credits	Ecosystem credits or species credits
Biodiversity Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site (Department of Planning Industry and Environment 2020).
Biodiversity Credit Report	The report produced by the Biodiversity Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site (Department of Planning Industry and Environment 2020).
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
Biodiversity value	Are the following values: – vegetation integrity--being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state – habitat suitability--being the degree to which the habitat needs of threatened species are present at a particular site – biodiversity values, or biodiversity-related values, prescribed by the regulations.
Candidate species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.
Cumulative impact	The extent to which the development or activity contributes to the cumulative impacts of existing and planned developments or activities on threatened species, ecological communities, habitats, Areas of Outstanding Biodiversity Value and key threatening processes.
Direct impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (Department of Planning Industry and Environment 2020).
Ecosystem species credits	Ecosystem species credits are a measurement of the value of threatened communities and habitat for those species that can be reliably predicted to occur with a Plant Community Type (PCT).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.

Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground. Trees must be examined from all angles.
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (Department of Planning Industry and Environment 2020).
IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system3, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion	A subregion of a bioregion identified under the IBRA system.
Investigation area	The Jindabyne Education Campus area subject to biodiversity assessment
Local Government Area (LGA)	Generic term for a local government geographical area.
Locality	The area within 10 km of the investigation area.
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Matters of National Environmental Significance	A Matter of National Environmental Significance (MNES) protected by a provision of Part 3 of the EPBC Act.
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (Department of Planning industry and Environment 2018).
Mitigation	Action to reduce the severity of an impact (Department of Planning Industry and Environment 2020).
Native vegetation	Means any of the following types of plants native to New South Wales: – trees (including any sapling or shrub or any scrub) – understorey plants – groundcover (being any type of herbaceous vegetation) – plants occurring in a wetland.
Patch size	An area of intact native vegetation that: – occurs on the development site or biodiversity stewardship site – includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.

PCT classification system	The system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification.
Plant community type	A NSW plant community type identified using the PCT classification system.
Population	A group of organisms, all of the same species, occupying a particular area.
Proposal	The proposed development project being assessed for this BDAR, the Jindabyne Education Campus.
Regional NSW	All of regional NSW (excludes metropolitan areas such as Greater Sydney, Newcastle and Wollongong).
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
State Environmental Planning Policy (SEPP)	Generic term for the state-wide regulatory instrument.
Study area	The proposal area and any other areas surveyed and assessed for biodiversity values which may be subject to indirect impacts.
Subject land	The land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the assessment area which surrounds the subject land (i.e. the area of land in a buffer zone around the subject land). In the case of a biodiversity certification proposal, subject land includes the biodiversity certification assessment area.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by EES and accessible from the BioNet website at www.bionet.nsw.gov.au
Threatened ecological community	Means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.
Threatened species	Critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Vegetation class	A level of classification of vegetation communities defined in Keith (2004) . There are 99 vegetation classes in NSW.
Vegetation formation	A broad level of vegetation classification as defined in Keith (2004) . There are 16 vegetation formations and sub-formations in NSW.
Vegetation integrity	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.
Vegetation integrity score	The quantitative measure of vegetation condition.
Vegetation type	A NSW plant community type
Vegetation zone	A relatively homogenous area of native vegetation that is the same PCT and broad condition state.

ABBREVIATIONS

*	Indicates exotic species
AWS	All Weather Station
BAM	Biodiversity Assessment Method 2020
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOS	NSW Biodiversity Offset Scheme
DBH	Diameter at breast height
EEC	Endangered Ecological Community
EES Group	Environment, Energy and Science Group
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
Ha	Hectares
IBRA	Interim Biogeographically Regionalisation of Australia
LGA	Local Government Area
MNES	Commonwealth Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
SAP	Special Activation Precinct
TEC	Threatened Ecological Community
WONS	Weeds of National Environmental Significance
VIS	Vegetation information system (BioNet Vegetation Classification)

1 INTRODUCTION

This Biodiversity Development Assessment Report (BDAR) accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of an application for a State Significant Development (SSD No 15788005). The SSDA is for a new education campus at Jindabyne, comprising of a new primary and high school, located at the Jindabyne Sport and Recreation Centre (JSRC).

This report addresses the Secretary's Environmental Assessment Requirements (SEARs). The Secretary's environmental assessment requirements (SEARs) for the proposal were issued on 7 April 2021. The SEARs relating to the key issue of biodiversity, and where these requirements are addressed in this BDAR, are outlined in Table 1.1 below.

This BDAR has been prepared in accordance with the Biodiversity Assessment Methodology 2020 (BAM) and will support the overarching EIS that will be prepared to address the potential impacts on the environment associated with the proposal. The report has been prepared to address Stage 1 and 2 of the BAM and provides an assessment of the biodiversity values of the investigation area and assessment of impacts. Whilst the primary purpose of this report is to provide an assessment of the biodiversity values of the investigation area in the context of the Biodiversity Conservation Act 2016 (BC Act) it also assesses 'Matters of National Environmental Significance' (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 1.1 SEARs relevant to this BDAR

SEARS REQUIREMENTS	WHERE ADDRESSED IN THIS DOCUMENT
11. Biodiversity	
Provide a Biodiversity Development Assessment Report (BDAR), that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the *Biodiversity Conservation Act 2016*, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land.	This document is the BDAR that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the *Biodiversity Conservation Act 2016*, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method.
Where a BDAR is not required, because a BDAR waiver has been issued, in relation to the development, provide: — a copy of the BDAR waiver and demonstrate that the proposed development is consistent with that covered in BDAR waiver. — an assessment of flora and fauna impacts where significant vegetation or flora and fauna values would be affected by the proposed development.	Not applicable. A BDAR is required for the proposal.

1.1 THE PROPOSAL

The proposed development is for the construction of the Jindabyne Education Campus comprising a new primary school and a new high school at Jindabyne (the proposal, see Figure 1.1). The proposal is located within the JSRC located at 207 Barry Way (see Figure 1.2) and will accommodate approximately 925 students with the capacity for expansion in the future.

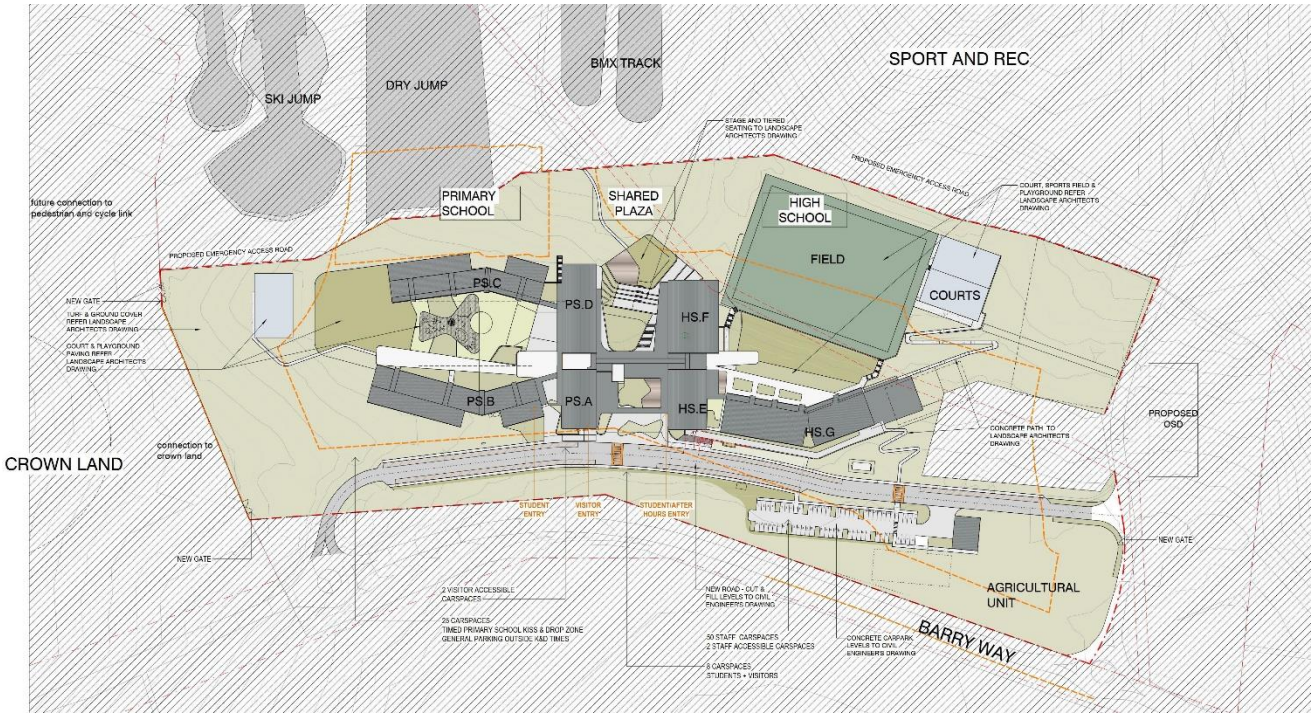
The new primary school will be located generally in the northern portion of the site whilst the new high school will be in the south of the site. While the schools are inherently separate identities, with separate student entries, opportunities for integration are provided in a central shared plaza with co-located school administration facilities, as identified in Figure

1.1 below and in Appendix I. This outdoor learning space is activated by the school canteen (shared) and separate core facilities including the primary school hall and library, and the high school gym and library, and provides opportunities for shared community use.

The new primary school will provide for a Core 21 school. This will comprise of 20 home base units and 2 support learning units, administration and staff facilities, covered outdoor learning area (COLA), hall, staff and student amenities, out of school care facilities, library and special programs. Landscaped areas include active and passive open space play areas, and a games court.

The new high school will provide for a stream 2 high school. This is to comprise of 20 general/specialised learning spaces and support learning units, administration and staff facilities, covered outdoor learning area (COLA), hall, staff and student amenities, library, an agricultural learning unit. Landscaped areas include active and passive open space play areas, a sports field and multipurpose games courts.

A new access driveway is proposed off Barry Way along the western boundary of the site and includes car parking, bus and private vehicle drop-off zones, and delivery zones.



Source: *DJRD Architects*

Figure 1.1 Proposed site plan

Source: Site Image Landscape Architects

Figure 1.2 Proposed landscape plan

1.2 SUBJECT LAND

The site of the proposed new education campus at Jindabyne is located within the western extent of the existing JSRC at 207 Barry Way (101 DP1019527). The site is located within the Snowy Monaro Regional Council local government area and is approximately 2.2km south of the Jindabyne town Centre. A site aerial is provided in Figure 1.2.

The subject land (see Figure 1.2) is approximately 9 ha in size, containing a former golf course and three existing workers cottages which were occupied during the construction of the Snowy Hydro Scheme. The majority of the site is undeveloped and contains maintained grasslands and scattered trees. Much of the surrounding land comprises remnant grassland, woodland and agricultural land.

As identified above, the site is within the existing JSRC which is a high performance and community sport centre located directly east of the site. The JSRC has a range of sporting facilities including a synthetic running track, cycling track, netball and tennis courts, fitness and indoor sports centres, and sporting ovals, as well as other services and accommodation facilities. The newly constructed BMX track is located directly east of the site with the new ski jump currently under construction to the northeast.

TAFE NSW have recently lodged a development application for a Connected Learning Centre (CLC) and Mobile Training Unit (MTU) which is proposed adjacent to the site. The CLC and MTU will utilise interactive, digitally enabled, flexible, and multipurposed learning environments to provide high-quality training and learning experiences accommodating a maximum of 20-25 students and 3 teachers.

The surrounding locality is generally rural in character with other land uses also including the Jindabyne Aero Club located to the west of the site on Tinworth Drive, an industrial area to the southwest and the Jindabyne Community recycling centre is located east of the JSRC.

The current assessment is undertaken using the information available at the time of reporting. For this assessment a 'worst-case scenario' has been presumed, where the construction and operational footprint for the Proposal will encompass the entirety of the subject land (see Figure 1.2).

1.3 SOURCES OF INFORMATION

The following information sources were used in the preparation of this report:

- aerial photographic imagery
- NSW Mitchell Landscapes 3.1 (Department of Planning Industry and Environment 2021)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (Department of the Environment and Energy 2018)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Bureau of Meteorology 2021)
- Directory of Important Wetlands of Australia (Department of Agriculture Water and the Environment 2021)
- Register of Declared Areas of Outstanding Biodiversity Value – Critical habitat declarations in NSW (Department of Planning Industry and Environment 2020)
- BioNet Threatened Species Profile Database (Department of Planning industry and Environment 2021)
- Commonwealth Species Profiles and Threats Database (Department of Agriculture Water and the Environment 2021)
- BAM Important Area Maps for threatened species (Department of Planning Industry and Environment. 2021).

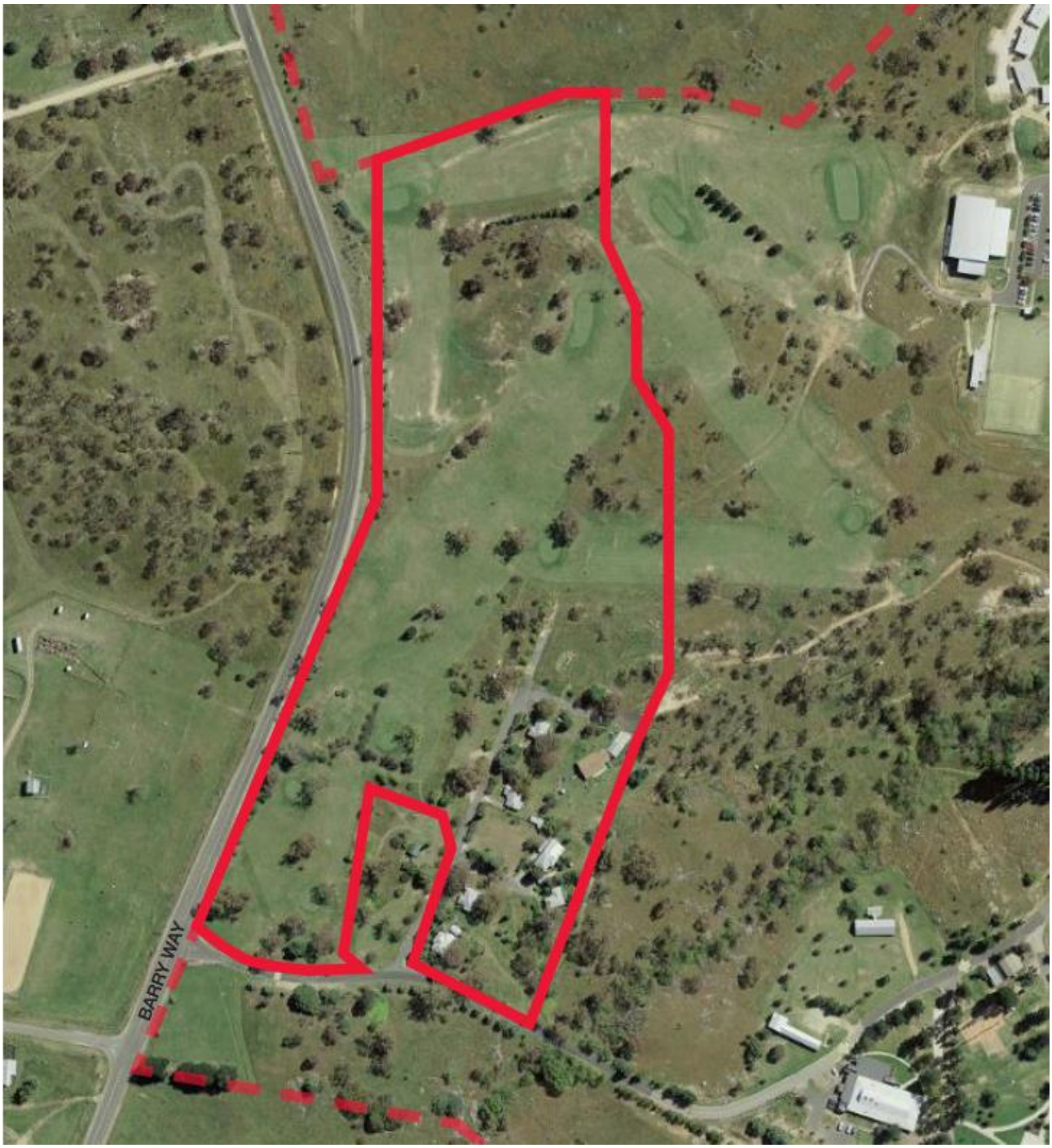


Figure 1.3 Map of the subject land boundary

The following vegetation mapping datasets and reports were reviewed:

- Eastern Bushlands Database VIS_ID 622 (Holme, 1993)
- Remote Sensing Mapping of Grassy Ecosystems in the Monaro VIS_ID 2513 (Walter and Schelling, 2004)
- Grassy ecosystems of the south eastern highlands: technical report: literature review, data audit, information gap analysis and research strategy. Grasslands, Pre-Settlement, South-eastern Highlands VIS_ID 4099 (Rehwinkel, 1997)
- Revision of Monaro Grassland Mapping (Rehwinkel, 2005).
- Monaro Grassland Mapping, 2005. VIS_ID 3915 (State Government of NSW and Department of Planning, Industry and Environment, 2013)

- Grasslands, Pre-Settlement, South-eastern Highlands. VIS_ID 4099 (State Government of NSW and Department of Planning, Industry and Environment 2015a)
- Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes, and SE Corner Bioregions VIS_ID 3858 & 3859 (Gellie, 2005)
- CRAFTI – Floristics and Structure, Southern CRA, Tumut Subregion VIS_ID 4141 and 4160 (Office of Environment and Heritage NSW, 1999)
- South East Local Land Services Biometric Vegetation Map, 2014. VIS_ID 4211 (EcoLogical Australia, 2014)
- CEEC: Monaro and Werriwa Tablelands Cool Temperate Grassy Woodlands v1.4 (State Government of NSW and Department of Planning, Industry and Environment 2019).

1.4 STRUCTURE OF REPORT

The structure and content of this report is as follows:

- Chapter 1 – Introduction: Outlines the background and need for the proposal, and the purpose of this report in accordance with Chapters 2 and 3 of the BAM.
- Chapter 2 – Landscape context: Provides information on a range of landscape features in accordance with Sections 3.1, 3.2 and Appendix E of the BAM that occur on the proposal study area and broader locality.
- Chapter 3 – Native vegetation: Provides information on native vegetation and threatened ecological communities in accordance with Chapter 4, Appendix A and Appendix H of the BAM and matters relating to the BC Act.
- Chapter 4 – Threatened species: Provides information on threatened species in accordance with Chapter 5 of the BAM and matters relating to the BC Act.
- Chapter 5 – Prescribed impacts: Identifies potential prescribed biodiversity impacts on threatened entities in accordance with Chapter 6 of the BAM.
- Chapter 6 – Avoiding and minimising impacts: Provides information on avoiding and minimising impacts on biodiversity values through the planning and design phase of the Proposal in accordance with Chapter 7 of the BAM.
- Chapter 7 – Assessment of impacts: Describes the potential construction and operational impacts on biodiversity associated with the Proposal in accordance with Chapter 8, Sections 8.1 and 8.2 of the BAM.
- Chapter 8 – Mitigation and management of impacts: Mitigation and management of impacts: Outlines the proposed mitigation measures for the Proposal on biodiversity matters in accordance with Chapter 8, Sections 8.4 and 8.5 of the BAM.
- Chapter 9 – Impact summary: Provides a summary of the potential impacts of the Proposal on biodiversity in accordance with Chapter 10 of the BAM.
- Chapter 10 – Biodiversity credit report: Provides a summary of the number and class of ecosystem credits required to offset the impacts of the Proposal in accordance with Section 10.2 of the BAM.
- Chapter 11 – Limitations: Outlines the limitations and assumptions made in conducting this assessment.
- Chapter 12 – References: Identifies the key reports and documents used to generate this report.

Appendices to this report includes:

- Appendix A – Threatened species habitat assessment and likelihood of occurrence assessment
- Appendix B – BAM floristic survey composition and plot data
- Appendix C – BAM vegetation integrity plot data
- Appendix D – BAM-C Predicted species report
- Appendix E – BAM-C Candidate species report
- Appendix F – Biodiversity credit report
- Appendix G – Protected matters search tool results
- Appendix H – Assessments of significance for EPBC Act listed species.

1.5 CURRENCY OF BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

I, Lukas Clews (BAM Accredited Assessor (BAAS17060), certify that this BDAR has been prepared on the basis of the requirements of (and information provided under) the current BAM dated 22 October 2020 available from https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/biodiversity-assessment-method.

The BAM-C case associated with this BDAR is 00026067/BAAS17079/21/00026069 / Revision: 7.

This BDAR has been prepared by a team of qualified and experienced ecologists and accredited BAM assessors (see Table 1.2).

Table 1.2 Personnel

NAME	ROLE	QUALIFICATIONS
Lukas Clews	Principal Ecologist – Field surveys and report preparation	Master of Scientific Studies, Graduate Certificate in Applied Science, Diploma Conservation and Land Management, Bachelor of Science Accredited BAM Assessor (BAAS17060)
Alicia Palmer	Field assistant and reporting	Bachelor of Science (Hons)
Selga Harrington	Technical input	Bachelor of Science (Hons) Accredited BAM assessor (BAAS17079)
Alex Cockerill	Technical review	Bachelor of Science (Honours 1) Accredited BAM assessor (BAAS17020)
Toby Lambert	Technical review	Bachelor of Environmental Science Accredited BAM assessor (BAAS17046)

2 LANDSCAPE CONTEXT

This chapter addresses landscape features and site context in accordance with Section 3 of the BAM and provides information on a range of landscape features that occur on the subject land and surrounding landscape.

The landscape features outlined below are used to inform the habitat suitability of the proposal study area for threatened species and the potential presence and movement of species across the landscape.

2.1 TOPOGRAPHIC AND HYDROLOGICAL SETTING, GEOLOGY AND SOILS

The project site occurs in the South Eastern Highlands bioregion and the Monaro subregion in the Snowy River local government area. The site occurs within the Jindabyne Plains landscape which is characterised by wide open valleys and plains at a general elevation of 800 to 900 m with surrounding low ranges and rounded peaks to 1,100 m on massive Silurian-Devonian granite and granodiorite. Soils include shallow gravelly loams, extensive red and yellow texture-contrast soils on slopes, two or three terraces marginal to the main streams with dark coloured gritty uniform loams and clays in alluvium. Vegetation is characterised by dry tussock grassland of rough and variable spear grasses (*Austrostipa variabilis*) with kangaroo grass (*Themeda triandra*) on valley floors, patches of open snow gum (*Eucalyptus pauciflora*) and black sallee (*Eucalyptus stellulata*) woodland on hills, open forest of yellow box (*Eucalyptus melliodora*), Blakely's red gum (*Eucalyptus blakelyi*), with mixed understorey on moister ranges merging with adjacent landscapes (Department of Planning Industry and Environment 2021).

The major water resource for the locality is Lake Jindabyne (located to the north and east of the study site) which receives flow from three primary tributaries, the Snowy River, the Thredbo River and Eucumbene River. This manmade lake is an important component of the Snowy Scheme and is mapped as Key Fish Habitat, primarily for its importance to the recreational fishing industry. There are no important wetlands mapped within the locality and the nearest Ramsar wetland is Blue Lake in Kosciusko National Park (27 km away). There are no waterways present within the subject land. One waterway, Lees Creek, occurs in the vicinity of the site, flowing through immediately east and north of the project site (Department of Planning Industry and Environment 2020).

2.2 NATIVE VEGETATION COVER

Native vegetation cover within the subject land and within a 1,500-metre buffer area was determined in accordance with Section 3.2 of the BAM and is summarised in Table 2.1. Percent native vegetation cover refers to the amount of native vegetation (woody and non-woody) that is estimated to be present in the landscape of the assessment area. Native vegetation extent is illustrated in Figure 3.2.

The percentage of native vegetation cover in the assessment area is assigned to one of the following classes:

a) 0–10%
b) >10–30%
c) >30–70%
d) >70%.

The 1,500 metre landscape buffer around the subject land has a native vegetation cover of 74%. This is due to a large area of non-woody native vegetation in the form of derived native grasslands. The estimate of native vegetation cover in the landscape is purely a desktop assessment and we have not made any attempt to verify the native content of all grassland areas within the 1,500 metre landscape buffer. We did not have access to any private property which limited the opportunity to conduct a field assessment to verify landscape features.

Based on our knowledge of grassland areas in other parts of the Jindabyne Sport and Recreation Centre and around Jindabyne we have taken a cautious approach and assumed these grassland areas are predominantly native and have not attempted to remove them from the assessment. As percentage of native vegetation cover is used as a filter by the BAM-C to predict threatened species likely to occur or use habitat on the subject land this approach is conservative.

We have applied the >70% native vegetation cover class in the BAM-C.

Table 2.1 Native vegetation cover

TOTAL ASSESSMENT AREA (HA)	AREA OF NATIVE VEGETATION COVER (HA)	NATIVE VEGETATION PERCENTAGE COVER (%)	COVER CLASS
914.17	672.80	74%	>70%

2.3 LANDSCAPE FEATURES

An overview of landscape features is presented in Table 2.2 including identification of:

- IBRA region and subregion
- NSW (Mitchell) landscape
- rivers, streams, estuaries and wetlands
- habitat connectivity
- karst, caves, crevices, cliffs, rocks and other geological features of significance
- areas of outstanding biodiversity value.

Table 2.2 Summary of landscape feature

LANDSCAPE FEATURE	DETAILS
IBRA region	South Eastern Highlands
IBRA subregion	Monaro subregion
NSW landscape regions (Mitchell landscapes)	Jindabyne Plains
Rivers, streams, estuaries and wetlands	The only named waterway in the assessment area is Lees Creek. There are six other unnamed 1st and 2nd order streams are also present (see Figure 2.1 and Figure 2.2). Riparian buffer distances are shown in Figure 2.1 and 2.2. No wetlands of international or national importance are present. Lake Jindabyne is present in the east of the Assessment Area (see Figure 2.1 and Figure 2.2).
Habitat connectivity	Habitat connectivity in the east around the Jindabyne township is patchy due to agricultural and urban development and infrastructure. However, physical and functional connectivity (stepping stones) from Lake Jindabyne through the subject land to the forested areas to the west and into the Kosciuszko National Park exists (see Figure 2.1 and Figure 2.2).
Karst, caves, crevices, cliffs, rocks and other geological features of significance	There are no Karst areas, caves or significant cliffs present. The granitoid geology of the assessment areas provide a number of areas with rocky outcropping, particularly the subject land areas around Lake Jindabyne. There is an area of Lees Creek to the west of Kosciuszko Road that has a small cliff face that is likely to contain crevices.

LANDSCAPE FEATURE	DETAILS
Areas of outstanding biodiversity value	Areas of Outstanding Biodiversity Value (AOBV) include areas of critical habitat previously listed under the *Threatened Species Conservation Act 1995.* AOBV include declared areas for the Gould's Petrel, Little Penguin, Mitchell's Rainforest Snail and the Wollemi Pine. None of these AOBV occur within the study area.

2.3.1 ANY ADDITIONAL LANDSCAPE FEATURES IDENTIFIED IN ANY SEARS FOR THE PROPOSAL

There were no additional landscape features identified in any SEARs for the proposal.

Figure 2.1 Site map

Figure 2.2 Location map

3 NATIVE VEGETATION

This chapter address native vegetation, threatened ecological communities and vegetation integrity in accordance with Section 4 of the BAM. Specifically, this section maps and identifies all native and non-native vegetation types within the investigation area and provides and assessment of vegetation integrity and whether any recorded vegetation types correspond to threatened ecological communities listed under the BC Act.

Native vegetation has been recorded by vegetation formation, class and associated PCT in accordance with the NSW BioNet Vegetation Classification System (EES, 2020). The mapping of vegetation zones was based on the sampling of PCT and broad condition states.

The vegetation mapping undertaken for this BDAR was completed within the specific survey sites. In accordance with the requirements of the BAM, vegetation integrity scores have been calculated using the indicative disturbance area.

3.1 DEFINITION OF NATIVE VEGETATION

Under the BAM, native vegetation has the same meaning as in section 1.6 of the BC Act which states that native vegetation and clearing native vegetation have the same meanings as in Part 5A of the Local Land Services Act 2013. Part 5A 60B of the *Local Land Services Act 2013* defines the meaning of native vegetation as any of the following types of plants native to New South Wales:

a trees (including any sapling or shrub or any scrub)
b understorey plants
c groundcover (being any type of herbaceous vegetation)
d plants occurring in a wetland.

A plant is native to New South Wales if it was established in New South Wales before European settlement. This includes planted vegetation. Cleared grassland areas that contain some native species must be assessed as native vegetation.

3.2 NATIVE VEGETATION METHODS

3.2.1 BACKGROUND RESEARCH

The aim of the background research was to identify threatened ecological communities recorded previously or predicted to occur in the locality of the investigation area.

Background research was undertaken to identify the likely distribution of native vegetation and threatened ecological communities, based on previous mapping and aerial photograph interpretation, for targeted field verification as required under Section 5.3 of the BAM (Department of Planning Industry and Environment 2020). The following information sources were used when conducting this research:

- Eastern Bushlands Database VIS_ID 622 (Holme, 1993)
- Remote Sensing Mapping of Grassy Ecosystems in the Monaro VIS_ID 2513 (Walter and Schelling, 2004)
- Grassy ecosystems of the south eastern highlands: technical report: literature review, data audit, information gap analysis and research strategy. Grasslands, Pre-Settlement, South-eastern Highlands VIS_ID 4099 (Rehwinkel, 1997)
- Revision of Monaro Grassland Mapping (Rehwinkel, 2005).
- Monaro Grassland Mapping, 2005. VIS_ID 3915 (State Government of NSW and Department of Planning, Industry and Environment, 2013)
- Grasslands, Pre-Settlement, South-eastern Highlands. VIS_ID 4099 (State Government of NSW and Department of Planning, Industry and Environment 2015a)

- Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes, and SE Corner Bioregions VIS_ID 3858 & 3859 (Gellie, 2005)
- CRAFTI – Floristics and Structure, Southern CRA, Tumut Subregion VIS_ID 4141 and 4160 (Office of Environment and Heritage NSW, 1999)
- South East Local Land Services Biometric Vegetation Map, 2014. VIS_ID 4211 (EcoLogical Australia, 2014)
- CEEC: Monaro and Werriwa Tablelands Cool Temperate Grassy Woodlands v1.4 (State Government of NSW and Department of Planning, Industry and Environment 2019)
- Southern CRA Riverina Highlands Mapping Extension. VIS_ID 4162 (Maguire *et al.*, 2000).

A database search was also undertaken using the Commonwealth Protected Matters Search Tool (PMST), searching the proposal site plus a 10 km buffer around the site to identify any potential additional TECs not identified during earlier surveys for the Snowy SAP project.

3.2.2 FIELD SURVEY

As part of the Snowy Special Activation Precinct project field surveys were undertaken by WSP over a broad investigation area inclusive of the project subject land on the 16 to 27 November 2020. These surveys sought primarily to collect broad-scale vegetation data and carry out threatened species surveys in accordance with BAM.

Additional biodiversity survey was undertaken by WSP in the subject land over a three-day period from 2–4 June 2021. The focus of this survey was to fulfil any requirements of the BAM within the subject land (including additional BAM Vegetation Integrity plots) as well as ground-truth the results of the previous surveys, background research, habitat suitability assessments, and to detect presence of threatened species and breeding habitat features for candidate threatened fauna. As these surveys were undertaken in winter, species richness was considerably lower than what could be expected for spring or summer. Grasses and many other groundcover species were hard to identify due to a lack of reproductive material in June 2021. As such, native species richness may be higher than that reported in the June 2021 plots in Appendix B.

Additional vegetation survey was undertaken on 21 and 22 April 2022 and included random meander survey to identify and refine vegetation zone boundaries as well as eight vegetation integrity plots.

3.2.2.1 STRATIFICATION AND VERIFICATION OF EXISTING NATIVE VEGETATION MAPPING

Preliminary mapping of vegetation community boundaries was undertaken through analysis of existing vegetation mapping and aerial photograph interpretation. Analysis of the aerial photographs was used to identify areas of disturbance (e.g. buildings, vehicle tracks, dams and power lines), vegetation structure and likely native versus exotic species composition throughout the investigation area. This provided an initial definition of vegetation communities into simple structural and disturbance classifications for verification during field surveys.

Vegetation within the proposal study area and locality has been mapped at the regional scale in various mapping projects with the most useful for this project being:

- Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes, and SE Corner Bioregions VIS_ID 3858 & 3859 (Gellie, 2005)
- South East Local Land Services Biometric Vegetation Map, 2014. VIS_ID 4211 (EcoLogical Australia, 2014)
- Monaro Grassland Mapping, 2005. VIS_ID 3915 (State Government of NSW and Department of Planning, Industry and Environment, 2013).

Field validation (ground-truthing) of the existing vegetation classifications was completed based on random meander surveys and BAM vegetation integrity plots. Field verification was undertaken to confirm underlying geology vegetation structure, dominant species, native diversity, condition, and presence of threatened ecological communities. This information was used to validate and refine this existing vegetation mapping to determine their associated PCT in accordance with the BioNet Vegetation Classification System and to identify vegetation zones.

3.2.2.2 MAPPING OF NATIVE VEGETATION ZONES

The vegetation within the proposal study area was firstly assessed to a PCT level and then aligned to a vegetation zone which is defined in the BAM as 'an area of native vegetation on the study area that is the same PCT and has a similar broad condition state'. A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, level of weed invasion, or combinations of these attributes which determine vegetation condition. Broad condition state is used for stratifying areas of the same PCT into a vegetation zone for determining the vegetation integrity score. The Vegetation Zone stratification used for this report are outlined in Table 3.1.

Table 3.1 Vegetation Zones identified within the subject lands

VEGETATION ZONE		DESCRIPTION
1	PCT 1191_ A	Woodland vegetation with predominantly native understorey.
2	PCT 1191_B	Derived grassland vegetation where canopy has been largely removed but groundcover vegetation is dominated by native species. Small, localised patches may have higher exotic species diversity. Exotic and native cover was variable between seasons.
3	PCT 1191_C	Derived grassland vegetation where canopy has been largely removed. Groundcover vegetation is dominated by native species. Generally, these areas had evidence of past disturbance including ground disturbance. Typically, the species diversity is low and consists of colonising and disturbance tolerant species such as *Ammobium alatum, Vittadinia muelleri.*
4	Exotic dominated grassland	Vegetation has been partially cleared and groundcover was dominated by exotic species. Sparse canopy may be present
5	Miscellaneous ecosystems-exotic trees/shrubs	Non-native vegetation consisting of exotic trees/shrubs with exotic dominated understorey

3.2.2.3 BAM VEGETATION INTEGRITY PLOTS

Vegetation integrity plots were completed in accordance with BAM. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in Figure 3.1.

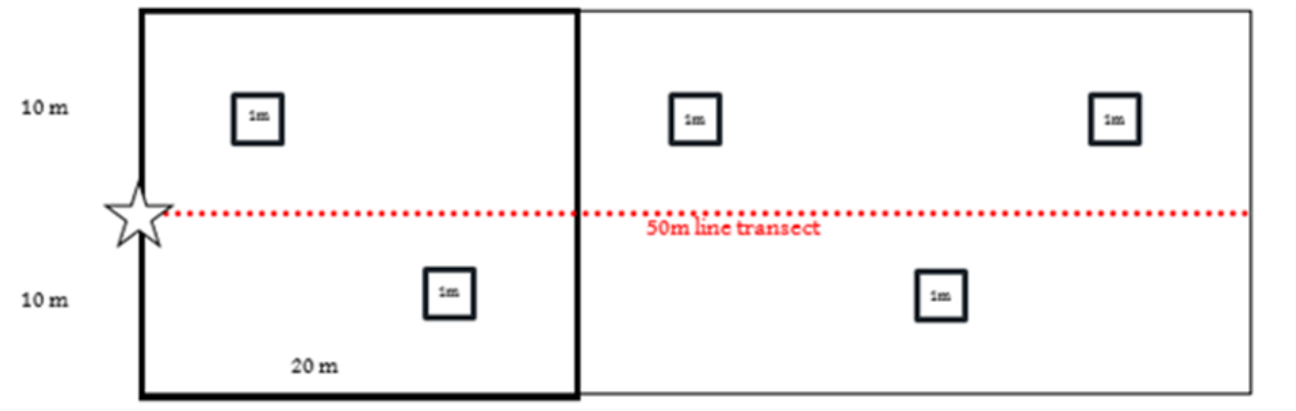


Figure 3.1 Vegetation integrity plot layout

The following site attributes were recorded at each vegetation integrity plot location:

- Location (easting – northing).
- Vegetation structure and dominant species and vegetation condition. Vegetation structure was recorded through estimates of percentage foliage cover, average height and height range for each vegetation layer.
- Native and exotic species richness (within a 400-metre squared quadrat): This consisted of recording all species by systematically walking through each 20 metre x 20 metre plot. The cover and abundance (percentage of area of quadrat covered) of each species was estimated. The growth form, stratum/layer and whether each species was native/exotic/high threat weed was also recorded.
- Number of trees with hollows (1000 metre squared quadrat): This was the frequency of hollows within living and dead trees within each 50 metre x 20 metre plot. A hollow was only recorded if (a) the entrance could be seen: (b) the estimated entrance width was at least 5 centimetres across: (c) the hollow appeared to have depth: (d) the hollow was at least 1 metre above the ground and the (e) the centre of the tree was located within the sampled quadrat.
- Number of large trees and stem size diversity (1000 metre squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 metre from the ground) of all living trees (>5 centimetre DBH) within each 50 metre x 20 metre plot. For multi-stemmed living trees, only the largest stem was included in the count. Number of large trees was determined by comparing living tree stem DBH against the PCTs benchmarks.
- Total length of fallen logs (1000 metre squared quadrat): This was the cumulative total of logs within each 50 metre x 20 metre plot with a diameter of at least 10 centimetres and a length of at least 0.5 metre.
- Litter cover: This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter <10 centimetre which is detached from a living plant) from within five 1 metre x 1 metre sub-plots spaced evenly either side of the 50-metre central transect.
- Evaluation of regeneration: This was estimated as the presence/absence of overstorey species present at the site that was regenerating (i.e. saplings with a diameter at breast height ≤5 centimetre).

Prior to establishing plot survey locations, vegetation stratification was undertaken to provide a representative vegetation zone for sampling. Stratification involved marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the study area and establishing the required number of plots at some of these waypoints.

The location of each BAM plot completed during the survey is illustrated in Figure 3.3. A summary of the survey effort completed to date in each vegetation zone is provided in Table 3.2.

Table 3.2 Minimum number of vegetation integrity plots required per vegetation zone area

VEGETATION TYPE	VEGETATION ZONE		AREA (HA)	MINIMUM PLOTS REQUIRED	NUMBER OF PLOTS COMPLETED
PCT 1191	1	PCT 1191_ A	1.36	1	7
	2	PCT 1191_B	1.93	1	4
	3	PCT 1191_C	0.21	1	1
Miscellaneous ecosystems	4	Exotic dominated grassland	4.31	-	3
	5	Exotic trees/shrubs	0.41	-	0 Patches of this vegetation zone were not large enough to allow plot survey. Rapid data point surveys were undertaken in these areas.
Cleared			0.5	-	-
TOTAL			**8.72**	**3**	**17**

3.3 NATIVE VEGETATION EXTENT

Native vegetation extent within the subject land, including cleared areas is shown in Figure 3.2. The only areas that have not been mapped as native vegetation are hardstand areas such as the existing roads, and existing buildings. All other areas contain native vegetation as it is defined in section 1.6 of the BC Act. In some cases, the only native vegetation that is present in an area is scattered native grasses and other groundcovers in an otherwise exotic pasture or lawn. However, these areas are still considered to have native vegetation.

Figure 3.2 Map of native vegetation extent

3.4 VEGETATION ZONES

The PCTs and Vegetation Zones identified within the subject land are outlined in Table 3.3 along with the area of each within the subject land, condition scores (composition, structure and function), and vegetation integrity score. . Vegetation Zones are illustrated in Figure 3.3.

Table 3.3 Native vegetation types, zones and integrity recorded within the subject land

PCT	VEGETATION ZONE[1]		PATCH SIZE CLASS[2]	HA IN SUBJECT LAND	COMPOSITION SCORE[3]	STRUCTURE SCORE[3]	FUNCTION SCORE[3]	VI SCORE[3,3]	HOLLOW-BEARING TREES
PCT 1191	1	PCT 1191_A	≥100	1.36	37.4	78.8	63.9	57.3	Present
	2	PCT 1191_B	≥100	1.93	22.7	49.5	0.1	4.8	Absent
	3	PCT 1191_C	≥100	0.21	24.8	54.4	10	23.8	Absent

(1) PCT 1191 is 95% cleared
(2) Patch size definition provided in Section 3.6
(3) Calculated using the BAM calculator based on vegetation plots
(4) Vegetation integrity indicates condition within a given vegetation zone.

3.5 PATCH SIZE

Patch size is defined under the BAM as an area of native vegetation that occurs on the proposal study area and includes native vegetation that has a gap of less than 100 metres from the next area native vegetation (or less than or equal to 30 metres for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the study area. Patch size area is assigned to each vegetation zone as a class, being less than 5 hectares, 5–24 hectares, 25–100 hectares or greater than or equal to 100 hectares.

Given the large areas of contiguous native vegetation recorded within and adjacent to the subject land the patch size for all native vegetation zones has been applied as greater than 100 hectares. For BAM-C purposes all native vegetation zones have been applied with a patch size area of 101 hectares.

Patch size is shown in Figure 3.5.

Figure 3.3 Map of vegetation zones within the subject land

Figure 3.4 Location of floristic vegetation survey plots and vegetation integrity survey plots

Figure 3.5 Map of patch size locations for each vegetation zone

3.6 PLANT COMMUNITY TYPE DESCRIPTIONS

There was only one PCT recorded in the subject land during the survey, Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion PCT (PCT 1191). PCT 1191 was separated into vegetation zones based on broad condition states as outlined in the BAM (see Section 3.5 of this report). There were also areas of non-native vegetation that were classed as Miscellaneous ecosystems (exotic trees/shrubs).

Table 3.4 Vegetation PCTs identified as occurring in the subject land

FIELD VERIFIED PCT	VEGETATION ZONE		AREA (HA)	VI SCORE(1)	THREATENED ECOLOGICAL COMMUNITY
PCT 1191	1	PCT 1191_ A	1.36	57.3	Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion
	2	PCT 1191_B	1.93	4.8	
	3	PCT 1191_C	0.21	23.8	

(1) VI score of less than 15 for a Critically Endangered Ecological Community does not require offsets under BAM.

3.6.1 PCT 1191: SNOW GUM – CANDLE BARK WOODLAND ON BROAD VALLEY FLATS OF THE TABLELANDS AND SLOPES, SOUTH EASTERN HIGHLANDS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

The Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion PCT (PCT 1191) is described in the BioNet Vegetation Classification database as an open forest, woodland (or occasionally as grassland patches) with a sparse shrub layer and a dense grassy groundcover occurring on frost-hollow flats and footslopes in undulating tableland areas between 600 and 1,100 m.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus stellulata, Eucalyptus viminalis, Eucalyptus bridgesiana,* and *Eucalyptus aggregata*. The shrub layer is characterised by *Acacia dealbata, Acacia melanoxylon,* and *Lissanthe strigosa.* The ground cover is characterised by species including *Chrysocephalum apiculatum, Elymus scaber, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Microlaena stipoides,* and *Themeda triandra*.

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 1191 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus pauciflora* with *Eucalyptus rubida, Eucalyptus stellulata* and occasional (planted) *Eucalyptus viminalis* and *Eucalyptus bridgesiana*.
- The mid stratum is characterised by the typical species *Acacia dealbata* and *Acacia melanoxylon*.
- The ground stratum contains species typical of PCT 1191 including *Chrysocephalum apiculatum, Elymus scaber, Gonocarpus tetragynus, Hydrocotyle laxiflora, Microlaena stipoides,* and *Themeda triandra*.

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 1191 within the subject lands is given below in Table 3.5. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Photos of PCT 1191 taken from within the subject lands showing variation are presented in Photo 3.1 to Photo 3.6.

This PCT is part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion as listed under the BC Act where it is present in the Monaro subregion.

Table 3.5 Floristic and structural summary of PCT 1191 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus stellulata, Eucalyptus viminalis, Eucalyptus bridgesiana*
Midstorey (mid-stratum)	*Acacia dealbata, Melicytus angustifolius* subsp. *divaricatus, Acacia melanoxylon, Pimelea pauciflora, Bossiaea buxifolia, Mirbelia oxylobioides*
Groundcovers (ground stratum)	*Crassula sieberiana, Austrostipa scabra, Poa sieberiana* var. *sieberiana, Hydrocotyle laxiflora, Bulbine bulbosa, Rumex brownii, Asplenium flabellifolium, Poa meionectes, Carex inversa, Wahlenbergia communis, Convolvulus erubescens, Microlaena stipoides, Acaena ovina, Geranium solanderi* var. *solanderi, Swainsona monticola, Rytidosperma tenuius, Elymus scaber, Acaena novae-zelandiae, Dichondra repens, Lomandra longifolia, Swainsona behriana, Vittadinia muelleri, Panicum effusum, Chrysocephalum apiculatum, Chrysocephalum semipapposum, Themeda triandra, Asperula conferta, Cymbonotus lawsonianus*
Exotic species	*Bromus hordeaceus, Petrorhagia nanteuilii, Echium plantagineum, Avena barbata, Arenaria leptoclados, Verbascum thapsus, Hirschfeldia incana, Trifolium arvense, Vulpia myuros, Taraxacum officinale, Hordeum leporinum, Hypochaeris radicata, Cirsium vulgare, Erodium cicutarium, Plantago lanceolata, Potentilla recta, Lolium perenne, Salvia coccinea, Marrubium vulgare*
High Threat Weeds	*Bromus diandrus, Crataegus monogyna, Acetosella vulgaris, Hypericum perforatum, Pyracantha* sp.

Note: Species list has been derived from surveys undertaken within PCT 1191 from surveys undertaken for the Snowy SAP project and the surveys undertaken within the subject land in June 2021 to provide a more complete picture of PCT 1191.

Photo 3.1 PCT 1191_A at Plot 3

Photo 3.2 PCT 1191_A at Plot 5

Photo 3.3 PCT 1191_B at Plot 7

Photo 3.4 PCT 1191_B showing large trees above mown lawn and exotic plantings

Photo 3.5 PCT 1191_B at plot 2

Photo 3.6 PCT 1191_C at plot 8a

Photo 3.7 Miscellaneous ecosystems – exotic shrubs/trees (conifers)

Photo 3.8 Miscellaneous ecosystems – exotic shrubs/trees (former garden shrubs)

Figure 3.6 Map of Plant Community Types within the subject land

3.7 BC ACT LISTED THREATENED ECOLOGICAL COMMUNITIES

The threatened ecological communities (TECs) listed under the BC Act that were recorded within the study area is outlined in this section.

3.7.1 MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION

Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is listed as a Critically Endangered Ecological Community under the BC Act. PCTs consistent with this TEC that are located in the subject land include:

- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

The Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion Final Determination (NSW Threatened Species Scientific Committee 2019), indicates that the TEC is located within the South Eastern Highlands Bioregion. The NSW Threatened Species Scientific Committee (2019) states that the intent of the TEC listing is to include all occurrences of the ecological community (both recorded and yet unrecorded, and independent of their condition) that occur within this bioregion be covered by the final determination. The TEC is characterised by a sparse to very sparse tree stratum dominated by *Eucalyptus pauciflora* either in monospecific stands or with any of *Acacia melanoxylon*, *Eucalyptus rubida* subsp. *rubida*, *Eucalyptus stellulata* or *Eucalyptus viminalis* as co-dominants (NSW Threatened Species Scientific Committee 2019). The dominant canopy species within PCT 1191 within the subject land are *Eucalyptus pauciflora* and *Eucalyptus rubida* subsp. *rubida* with occasional *Acacia melanoxylon*.

PCT 1191 within the subject land, and locality, contains a number of plant species from the characteristic assemblage of species listed in Part 1 of the final determination (see (NSW Threatened Species Scientific Committee 2019)). The data from the June 2021 survey does not provide a representative sample of floristic diversity as it was done in winter. Data collected from this same PCT on other areas of the Sport and Recreation Centre and in other areas around Jindabyne in November and December 2020 provide better data. The species recorded during these November and December 2020 surveys show that PCT 1191 contains species including *Acacia dealbata, Acacia melanoxylon, Acaena novae-zelandiae, Asperula conferta, Asperula scoparia, Austrostipa scabra, Bossiaea buxifolia, Carex inversa, Chrysocephalum apiculatum, Chrysocephalum semipapposum, Cymbonotus lawsonianus, Desmodium varians, Dichondra repens, Elymus scaber, Epilobium billardierianum, Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus stellulata, Eucalyptus viminalis, Euchiton japonicus, Gonocarpus tetragynus, Hydrocotyle laxiflora, Melicytus angustifolius* subsp. *divaricatus, Microlaena stipoides, Mirbelia oxylobioides, Oxalis perennans, Panicum effusum, Plantago varia, Poa sieberiana, Poa labillardierei, Rumex brownii, Scleranthus biflorus, Themeda triandra, Veronica gracilis,* and *Wahlenbergia communis*.

Trees may be absent from this TEC as a consequence of tree removal under pastoral management and grazing by domestic stock (NSW Threatened Species Scientific Committee 2019). As such, the areas of derived native grassland corresponding to PCT 1191 within the subject land are considered to be part of this TEC, albeit in a disturbed state (note that the TEC listing includes all occurrences of the ecological community independent of their condition). BAM floristic plot data is provided in Appendix B.

Figure 3.7 Map of Threatened Ecological Community distribution on the subject land

3.8 THREATENED ECOLOGICAL COMMUNITIES - SAII ENTITIES

The Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is listed as a Critically Endangered Ecological Community under the BC Act and is identified as a threatened entity at risk of a Serious and Irreversible Impact (SAII). PCTs consistent with this TEC that are located in the subject land include:

- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

3.9 EPBC ACT LISTED THREATENED ECOLOGICAL COMMUNITIES

The PMST search undertaken as part of the background research identified three threatened ecological communities that were either known to occur within the search area, likely to occur within the search area, or may occur within the search area. These communities are detailed in Table 3.6.

Table 3.6 Ecological communities predicted to occur within a 10 km buffer of the Proposal site

COMMUNITY NAME	EPBC ACT	BC ACT	DESCRIPTION
Alpine Sphagnum Bogs and Associated Fens	E	E	The Alpine Sphagnum Bogs and Associated Fens ecological community is characterised by two distinct components of high mountain wetlands - bogs and fens. The bogs component can usually be defined by the visual presence of *Sphagnum spp.* and the fens are shallow, open water pools with or without emergent aquatic plants, often near to, or surrounded by bogs (Department of the Environment 2015).
Natural Temperate Grassland of the South Eastern Highlands	CE	-	Natural Temperate of the South Eastern Highlands is characterised as treeless or sparsely treed (<10% projected foliage cover) with a ground cover dominated by native tussock grasses such as *Themeda triandra* and *Poa sieberiana* (Department of the Environment and Energy 2016)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	CE	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characterised by the presence or prior occurrence of White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*) or Blakely's Red Gum (*Eucalyptus blakelyi*). It has a ground layer of native tussock grasses and herbs, and a sparse, scattered shrub layer (Department of Planning Industry and Environment 2020)

None of the threatened ecological communities identified during preliminary searches were found to be present within the study area during the recent site survey (Section 3.2.2). None of these TECs are present in or adjacent to the subject land.

Discussion is provided below in Section 3.8.1 on the Natural Temperate Grassland of the South Eastern Highlands TEC in relation to the vegetation within the subject land, particularly the exotic dominant grasslands.

3.9.1 DISCUSSION ON NATURAL TEMPERATE GRASSLAND OF THE SOUTH EASTERN HIGHLANDS

While there are large areas of grassland within the subject land, the Natural Temperate Grassland of the South Eastern Highlands TEC is not present. There are no naturally occurring grasslands within the subject land. The grassland in the subject land is derived from PCT 1191. In the Southern Tablelands natural temperate grasslands are located at altitudes between 560 and 1,200 metres primarily in the valleys and lower slopes, and on the broader plains (Threatened Species Scientific Committee, 2016a). Based on landscape position and existing woodlands on the hills around Jindabyne, the original vegetation cover of the subject lands within the South Eastern Highlands bioregion would have been grassy woodland consisting of PCT 1191.

An examination of the vegetation within the subject lands compared to the key diagnostic criteria for the Natural Temperate Grassland of the South Eastern Highlands TEC (see Threatened Species Scientific Committee, 2016a) is provided below. For EPBC Act referral, assessment and compliance purposes, the national ecological community is limited to patches that meet key diagnostic characteristics and condition thresholds.

The grassland is situated in the correct IBRA subregion (Monaro) and the subject lands are located at the correct elevations between 350–1,200 m above sea level.

The grasslands do contain characteristic grass species including *Poa sieberiana, Poa labillardierei, Themeda triandra, Bothriochloa macra, Rytidosperma tenuius, Elymus scaber, Austrostipa scabra, Austrostipa bigeniculata, Dichelachne* sp., *Panicum effusum*, and *Enneapogon nigricans*. However, these grass species are also common to the grassy woodlands of PCT 1191.

The grassland areas also contain a range of native forb species in low density and again these species are also common to the grassy woodlands of PCT 1191.

Tree and shrub cover is generally <10% cover in the grassland areas but this is likely due to removal of the canopy and a history of grazing by livestock and pest species.

Importantly, the final key diagnostic characteristic area not met as the grasslands within the subject lands are considered to be derived or secondary grasslands (i.e. a grassland derived from clearing of a woodland or forest community) for the following reasons:

- There is evidence that trees formerly occurred on the subject lands in a density greater than that which would produce a 10% projective foliage cover. The grassland areas contain large old remnants trees and there are areas with a number of standing dead trees. Tree stumps are present. There are Grassy Woodlands dominated by *Eucalyptus pauciflora* and *Eucalyptus rubida* (i.e. PCT 1191) directly adjacent to the grassland areas and in the broader locality on the hills around Jindabyne in similar topographical positions and geological substrates suggesting that woodland would have also originally occurred in the subject land.
- There is no evidence to suggest that tree species would not grow on the areas where the grasslands are present, e.g. slopes in the same topographical position where woodlands are currently present.

The conclusion that the grassland within the subject lands is derived or secondary grassland is supported by regional vegetation mapping projects. The Grasslands, Pre-Settlement, South-eastern Highlands. VIS_ID 4099 (State Government of NSW and Department of Planning, Industry and Environment 2015a) mapping indicates that the lower elevation areas now flooded by Lake Jindabyne would have originally been a mix of ‘wet grassland’ and ‘dry grassland’ and the mapping indicates that the subject lands were not originally grassland.

As such, the grassland areas in the subject land are considered to be derived from PCT 1191 and not part of the EPBC Act listed TEC.

4 THREATENED SPECIES

4.1 BACKGROUND RESEARCH

The aim of the background research was to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed Migratory species or critical habitat recorded previously or predicted to occur in the locality of the investigation area.

Background research was undertaken to identify:

- a list of predicted and candidate threatened and migratory species and populations of flora and fauna to assess the habitat suitability and threatened biodiversity data collection as required under Section 5 of the BAM (Department of Planning Industry and Environment 2020), the BC Act and the EPBC Act.

This allowed for known habitat characteristics of to be compared with those present within the study area to determine the likelihood of occurrence of each species or populations. These results informed the identification of appropriate field survey effort and the groups likely to occur.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the investigation area were obtained from a range of databases as detailed in Table 4.1.

Table 4.1 Database searches undertaken

DATABASE	SEARCH DATE	AREA SEARCHED	REFERENCE
EES BioNet Atlas of NSW Wildlife	20 December 2021	Proposal site + 10 km buffer	(Department of Planning Industry and Environment 2022)
EPBC Act Protected Matters Search Tool	20 December 2021	Proposal site + 10 km buffer	(Department of Agriculture Water and the Environment 2022)
PlantNet Database	1 June 2021	Jindabyne region including 10 km buffer	(Royal Botanic Gardens and Domain Trust 2021)
Biodiversity Assessment Method (BAM) Calculator (Credit Calculator)	N/A	The Monaro IBRA subregion	
Atlas of Living Australia (ALA)	20 December 2021	Proposal site + 10 km buffer	(Atlas of Living Australia 2021)

4.2 THREATENED SPECIES FIELD SURVEY

As part of the Snowy Special Activation Precinct project field surveys were undertaken by WSP over a broad investigation area inclusive of the project subject land on 16–27 November 2020. These surveys sought primarily to collect broad-scale vegetation data and carry out threatened species surveys in accordance with BAM and relevant guidelines to support the BAM Calculator.

Additional biodiversity survey was undertaken by WSP in the Proposal site over a three-day period from 2–4 June 2021. The focus of this survey was to fulfil any requirements of the BAM within the subject land (including additional BAM Vegetation Integrity plots) as well as ground-truth the results of the previous surveys, background research, habitat suitability assessments, and to detect presence of threatened species and breeding habitat features for candidate threatened fauna. This field survey of the subject land was undertaken by a team of two appropriately qualified ecologists (detailed in Table 4.2).

Table 4.2 Detail of survey personnel and experience

NAME	ROLE	RELEVANT EXPERIENCE
Lukas Clews	Principal Ecologist	Lukas has over 15 years' experience in ecology and environmental management and has a broad range of experience in ecological consulting projects across NSW, with expertise in impact assessments, flora and fauna surveys, vegetation mapping, targeted threatened species surveys and biodiversity offsets. Lukas led the ecology team in the field surveys for the Snowy Mountains SAP project and has a comprehensive understanding of the ecological values of the area and the technical requirements for the project.
Alicia Palmer	Assistant Ecologist	Alicia has previously been involved in the survey and reporting for biodiversity assessments and reporting (including BDARs) for other infrastructure projects within NSW and has experience in ecological survey, monitoring and management, having previously worked for the NSW Department of Planning, Industry and Environment (DPIE), specialising in threatened flora and fauna work inclusive of the environments within the proposal region.

Field surveys aimed to identify threatened species that were found during background research and from previous work completed by WSP on the area (during the Snowy SAP project). The survey aimed to identify plant species that may be surveyed for within the survey period or may be surveyed all year (see Appendix A for list of potential species).

Threatened fauna species that were identified from background research and from previous work completed by WSP on Snowy SAP were primarily assessed via faunal habitat assessments (see Section 4.2.2.1 below). Additional assessment was undertaken for one species, koala, which may be surveyed all year and was within the scope of the project.

4.2.1 THREATENED FLORA SPECIES FIELD SURVEY

Targeted surveys for threatened flora species have not been undertaken for this BDAR due to seasonal survey requirements falling outside project timelines.

4.2.2 THREATENED FAUNA SPECIES FIELD SURVEY

4.2.2.1 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments were undertaken to assess the likelihood of threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the investigation area. Fauna habitat assessments were the primary assessment tool in assessing whether threatened species were likely to occur. The fauna habitat characteristics assessed included:

- structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- presence of mistletoes providing potential foraging resources
- presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles
- presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- presence of waterways (ephemeral or permanent) and water bodies.
- presence of man-made structures (e.g. culverts) for roosting/breeding microchiropteran bats.

The following criteria were used to evaluate the condition of habitat values:

- **Good:** A full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
- **Moderate:** Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
- **Poor:** Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing in the past.

4.2.2.2 OPPORTUNISTIC SIGHTINGS

Opportunistic sightings of animals were recorded including birds, mammals, frogs, and reptiles. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc., was also noted. This provided indirect information on animal presence and activity.

4.2.2.3 KOALA SCAT SEARCHES

Koala scat searches (Spot Assessment Technique) were undertaken under all potential habitat trees identified within the subject land. These searches involved a thorough search the ground cover, leaf and tree litter within a 1m radius around the base of the tree to identify any potential koala scats, indicating presence. The location of trees searched within the subject land is illustrated in Figure 4.1.

The Koala surveys were undertaken in 2021 before the release of the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (State of NSW and Department of Planning and Environment, 2022). Koala use trees identified for the Central and Southern Tablelands koala modelling region (State of NSW and Department of Planning and Environment, 2022) including *Eucalyptus pauciflora* and *Eucalyptus rubida* are present in the subject land. The scat searches focused on the Koala use trees across the entire subject land (see Figure 4.1).

4.2.2.4 HOLLOW-BEARING TREE SURVEY

Hollow-bearing tree surveys were undertaken within the subject land to identify any potential trees that may provide breeding habitat for threatened species such as Gang-gang Cockatoo, Powerful Owl and Barking Owl. The location of trees searched within the subject land is illustrated in Figure 4.1.

4.2.2.5 TARGETED FAUNA SURVEYS

Targeted surveys were undertaken over three days and two nights, 10- 12 May 2022 targeting species credit species:

- Threatened owls:
  - Barking Owl (*Ninox connivens)*
  - Powerful Owl (*Ninox strenua*).
- Pink Robin (*Petroica rodinogaster*).

The survey method and effort is summarised in Table 4.3 with more detailed methodology provided below.

Table 4.3 Additional targeted surveys

SCIENTIFIC NAME	COMMON NAME	SURVEY SEASON	SURVEY METHOD	SURVEY EFFORT
Ninox connivens	Barking Owl	May – December	Stag watching, spotlighting and call playback. Searches for indirect evidence of use of site (e.g. owl pellets, prey)	8 person hours over 2 nights in May
Ninox strenua	Powerful Owl	May – August		
Petroica rodinogaster	Pink Robin	All year	Diurnal bird surveys	4 person hours over three days in May

Weather conditions during these targeted surveys is detailed in Table 4.4.

Table 4.4 Weather conditions during targeted surveys

DATE	SURVEY TYPE	TIME	CONDITIONS			
			TEMP (°C)	CLOUD COVER (%)	WIND	RAIN
10/05/22	Diurnal bird survey (dusk)	4:45 pm	13	60	Still	None
10/05/22	Stag watching, spotlighting, call playback	5:15 pm	12	60	Still	None
11/05/22	Diurnal bird survey (dawn)	6:00 am	9	90	Still	None
11/05/22	Diurnal bird survey (dusk)	4:45 pm	12	90	Light breeze	None
11/05/22	Stag watching, spotlighting, call playback	5:15 pm	12	80	Light breeze	None
12/05/22	Diurnal bird survey (dawn)	6:00 am	10	90	Still	7.8mm

DIURNAL BIRD SURVEYS

Formal diurnal bird searches were completed within the study area, specifically targeting the Pink Robin (*Petroica rodinogaster*) and Glossy Black Cockatoo (*Calyptorhynchus lathami*). Bird surveys were completed at dusk and dawn and commenced in areas of bird activity and radiated out across the study area over a period of 30 minutes. Hollow-bearing trees were inspected from the ground level – species occupying hollows or signs of utilisation or previous occupation were recorded. All birds were identified to the species level, either through direct observation or identification of calls. Birds were also recorded opportunistically during other field surveys. For the Glossy Black-Cockatoo the absence of *Allocasuarina* and *Casuarina* species was noted in order to cover this known habitat constraint.

SPOTLIGHTING AND CALL PLAYBACK

Spotlighting was used to target Barking Owl (*Ninox connivens*), Powerful Owl (*Ninox strenua*) and Greater Glider (*Petauroides volans*), and opportunistically search for other arboreal, flying or ground-dwelling animals that may occupy the site. Spotlighting was completed after dusk over two nights and completed on foot using high-powered headlamps. Sighted animals were identified to the species level.

Call playback was used to survey for both the Barking Owl and Powerful Owl, using standard methods. Call playback was completed after dusk and was utilised primarily around a large tree that was assumed as potential breeding habitat for these species.

For Barking Owl and Powerful Owl call play back, an initial listening period of 5 minutes was undertaken. Using a Bluetooth speaker, the calls of the Barking Owl and Powerful Owl were then played for 1 minute intervals followed by another listening period. Following this, a spotlight search was undertaken for 10 minutes after call playback to identify if either the Barking Owl or Powerful Owl may have been present but not responding.

STAG WATCHING

Stag watching was used to survey potential roosting hollows, targeting both the Barking Owl and Powerful Owl. This involved stationing observers beneath the hollow-bearing tree, observing from 30 minutes before to 30 minutes after dusk. No head torches or spotlights were utilised during this period as to not disturb or deter these species. Prior to commencing the survey, the trees and the ground beneath these trees were searched for presence of either species, such as white-wash, animal remains, and feathers. Sighted animals were identified to the species level.

4.2.3 FIELD SURVEY LIMITATIONS

No sampling technique can eliminate the possibility that a species is present on a site. For example, some species of plant may be present in the soil seed bank and some fauna species use habitats on a sporadic or seasonal basis and may not be present on site during surveys. The conclusions in this report are based upon previous studies, data acquired for the site and the biodiversity field surveys and are, therefore, merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of species. Also, it should be recognised that site conditions, including the presence of threatened species, can change with time.

Surveys were undertaken in Winter outside optimal survey season for a number of species which are difficult to detect outside these times. Targeted season surveys for candidate threatened species have not been undertaken for this BDAR and have been recommended where potential habitat occurs.

Figure 4.1 Targeted threatened species surveys

4.3 ASSESSING HABITAT SUITABILITY FOR THREATENED SPECIES

In the BAM, threatened species are assessed as either ecosystem credit species, species credit species or a combination of the two (referred to as 'dual credit species'). The BAM defines these threatened species categories as follows:

- ecosystem credit species (predicted): are those threatened species where the likelihood of occurrence and/or elements of its habitat can be confidently predicted by vegetation surrogates and landscape features
- species credit species (candidate): are those threatened species that cannot be reliably predicted by habitat surrogates
- dual credit species: are those threatened species where part of the habitat is assessed as an ecosystem credit (e.g. foraging habitat) and part as a species credit (e.g. breeding habitat). In this report, dual credit species will be included in both ecosystem and species credit assessment.

The BAM sets out six steps for assessing habitat suitability for threatened species (ecosystem credit species and species credit species), these are:

Ecosystem and species credit species (includes dual species):

- Step 1: Identify threatened species for assessment (BAM subsection 5.2.1)
- Step 2: Assess the habitat constraints and vagrant species on the subject land (BAM subsection 5.2.2)

Species credits species only (includes dual species):

- Step 3: Further assessment of candidate species credit species (BAM subsection 5.2.3)
- Step 4: Determine the presence of a candidate species credit species (BAM subsection 5.2.4)
- Step 5: Determine the area or count, and location of suitable habitat for a species credit species (a species polygon) (BAM subsection 5.2.5)
- Step 6: Determine the habitat condition within the species polygon for species credit species assessed by area (BAM subsection 5.2.6).

These six steps were used to assess the suitability of habitat within the Proposal area for threatened species. The threatened species habitat suitability assessments completed for the Proposal are provided in Appendix A of this report. The BAM also requires the assessor to review additional information about threatened species when determining if any predicted or candidate species inclusions are applicable. This involved searches of threatened species databases and likelihood of occurrence assessments which are described below.

4.3.1 HABITAT SUITABILITY FOR SPECIES THAT CAN BE PREDICTED BY HABITAT SURROGATES (ECOSYSTEM CREDIT SPECIES)

Ecosystem credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. Ecosystem credit threatened species have been assessed in conjunction with information about site context (Section 1 of the BAM), PCTs and vegetation integrity attributes (Chapter 4 of the BAM), and data from the NSW Threatened Biodiversity Data Collection (TBDC) (Department of Planning industry and Environment 2021).

4.3.2 HABITAT SUITABILITY FOR SPECIES THAT CANNOT BE PREDICTED BY HABITAT SURROGATES (SPECIES CREDIT SPECIES)

Species credit species are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits. Species credit species are those species for which the likelihood of occurrence, or elements of suitable habitat, cannot be confidently predicted by vegetation surrogates or landscape features. Species credit species have been assessed in conjunction with information collected about the site context of the development site (Section 1 of the BAM), on PCTs and vegetation integrity attributes in (Chapter 4 of the

BAM), and data obtained from the Threatened Biodiversity Data Collection (Department of Planning industry and Environment 2021).

4.4 THREATENED SPECIES RESULTS

4.4.1 THREATENED FLORA SPECIES

No threatened flora species were recorded on the subject land during survey. Thirteen threatened flora species were identified by the BAM calculator as species credit species (see Appendix A). These species were subject to a habitat and likelihood of occurrence assessment.

The list of Candidate threatened flora species is outlined in Table 4.5.

The full threatened species habitat suitability assessment is provided in Appendix A. Species were removed from the assessment if the geographic or habitat limitations for the species were not met or of the habitat was substantially degraded to the point that a candidate species is unlikely to occur. All other candidate species were retained for the assessment. The justification for including or excluding species credit species from the assessment is provided in Table 4.5.

The threatened plant species retained for assessment after the habitat assessment stage include:

- *Calotis glandulosa*
- *Leucochrysum albicans* var. *tricolor*
- *Prasophyllum petilum*
- *Swainsona sericea*
- *Thesium australe.*

These threatened plant species are known to occur in PCT 1191 so broadly suitable habitat is present in the subject land. Targeted surveys for these species have not been undertaken so according to the BAM these species are assumed to be present.

Calotis glandulosa (Mauve Burr-daisy), is a threatened plant species that is considered to be an entity at risk of a SAII and it is assumed to be present in the subject land based on the presence of an associated PCT in the form of PCT 1191. In the absence of a targeted survey in the correct season, the only approach to the assessment of *Calotis glandulosa* in the presence of potentially suitable habitat is to assume presence.

Species polygons (showing potential habitat in the absence of targeted survey) are provided in Figure 4.2a.

Table 4.5 Summary of candidate threatened flora species (species credit species) that were assessed

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Caladenia tessellata	Thick Lip Spider Orchid	V	E	None	None	Excluded as there are no existing records of this species from south of Canberra and Braidwood and as such there are no records of this species within the Monaro IBRA subregion. The microhabitats in the subject land are also considered to be degraded to the point that the species is unlikely to use the subject land. This is based on past disturbance and disturbed condition of the ground layer.	Moderate	Yes	Excluded
Calotis glandulosa	Mauve Burr-daisy	V	V	None	South of Michelago	Conservatively included. The subject land is south of Michelago so the geographic limitation for this species is met. This species has potential habitat within the subject land and is known to occur in disturbed habitats.	Moderate	Yes	Assumed present
Commersonia prostrata	Dwarf Kerrawang	E	E	None	None	Included for survey. May be surveyed for year round.	High	No	Surveyed- not present
Diuris aequalis	Buttercup Doubletail	V	E	None	North of Hoskinstown, NSW	Excluded as geographic limitation not met.	High	No	Excluded
Dodonaea procumbens	Creeping Hop-bush	V	V	None	Cooma-Monaro shire (south of Michelago)	Excluded as geographic limitation not met and not recorded during survey (may be surveyed for year-round).	Moderate	No	Excluded

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Eucalyptus aggregata	Black Gum	V	V	None	East of a line that runs north to south about 5 km west of Bungendore	Excluded as geographic limitation not met.	High	No	Excluded
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	E	None	None	Included for survey. May be surveyed for year round.	High	No	Surveyed- not present
Euphrasia scabra	Rough Eyebright	-	E	Montane bog or within 50 m	None	Excluded as habitat constraint not met.	High	Yes	Excluded
Leucochrysum albicans var. *tricolor*	Hoary Sunray	E	-	None	None	Conservatively included. This species has potential habitat within the subject land.	Moderate	No	Assumed present
Prasophyllum petilum	Tarengo Leek Orchid	E	E	None	None	Conservatively included. This species has potential habitat within the subject land.	High	No	Assumed present. Excluded from disturbed vegetation zones 1191_B and 1191_C.
Rutidosis leptorrhynchoides	Button Wrinklewort	E	E	None	None	Included for survey but the subject land may be outside the known distribution of this species as there are no records south of Bredbo in NSW.	High	No	Surveyed- not recorded
Swainsona sericea	Silky Swainson-pea	-	V	None	None	Conservatively included. This species has potential habitat within the subject land and there is a nearby record west of Barry Way.	High	No	Assumed present
Thesium australe	Austral Toadflax	V	V	None	None	Conservatively included. This species has potential habitat within the subject land.	Moderate	No	Assumed present

Key: CE = critically endangered, E = endangered, V = vulnerable

4.4.2 THREATENED FAUNA SPECIES

No threatened fauna species were recorded on the site during survey. Twenty-four threatened fauna species were identified by the BAM calculator (see Appendix A). These species were subject to a habitat and likelihood of occurrence assessment.

4.4.2.1 PREDICTED THREATENED FAUNA SPECIES - ECOSYSTEM CREDIT SPECIES

The list of Predicted threatened fauna species returned from the BAM calculator is provided in Table 4.6. The full threatened species habitat suitability assessment is provided in Appendix A.

Species were removed from the assessment if the geographic or habitat limitations for the species were not met or if the habitat was substantially degraded to the point that a candidate species is unlikely to utilise the development site. The only ecosystem credit species removed from consideration was Glossy Black-Cockatoo based on the absence of *Allocasuarina* and *Casuarina* species from the subject land (foraging habitat absent). All other predicted ecosystem credit species were retained for the assessment.

The justification for including or excluding predicted ecosystem credit species from the assessment is provided in Table 4.6. Targeted surveys for ecosystem credit species are not required.

Table 4.6 Summary of predicted threatened fauna species (ecosystem credit species) that were assessed

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS
Birds					
Anthochaera phrygia	Regent Honeyeater (foraging)	CE	CE	Conservatively included. Potential foraging habitat is present on the subject land.	High
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	V	Conservatively included. Potential foraging habitat is present on the subject land.	Moderate
Callocephalon fimbriatum	Gang-gang Cockatoo (foraging)	-	V	Conservatively included. Potential foraging habitat is present on the subject land.	Moderate
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	V	Excluded as no *Allocasuarina* or *Casuarina* species present on subject land (habitat constraint not met). There is no foraging habitat for this species.	High
Chthonicola sagittata	Speckled Warbler	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Circus assimilis	Spotted Harrier	-	V	Conservatively included. Potential foraging habitat is present on the subject land.	Moderate
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Daphoenositta chrysoptera	Varied Sittella	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS
Glossopsitta pusilla	Little Lorikeet	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Haliaeetus leucogaster	White-bellied Sea-Eagle (foraging)	-	V	Conservatively included. Potential foraging habitat is present in the subject land. Habitat constraint met - Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	High
Hieraaetus morphnoides	Little Eagle (foraging)	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate
Hirundapus caudacutus	White-throated Needletail	V	-	Conservatively included. Potential foraging habitat is present in the subject land.	High
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate
Neophema pulchella	Turquoise Parrot	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Ninox connivens	Barking Owl	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Ninox strenua	Powerful Owl	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Petroica boodang	Scarlet Robin	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate
Petroica phoenicea	Flame Robin	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate
Stagonopleura guttata	Diamond Firetail	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	Moderate
Mammals					
Dasyurus maculatus	Spotted-tail Quoll	E	V	Conservatively included. Species is wide ranging and may occur in the subject land on occasion. Rare occurrences of dispersing animals cannot be entirely discounted.	High
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High
Miniopterus orianae oceanensis	Large Bent-winged Bat (foraging)	-	V	Conservatively included. Potential foraging habitat is present in the subject land.	High

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS
Petaurus australis	Yellow-bellied Glider	-	V	Conservatively included. Potential foraging habitat is present in the subject land but there are no records in greater Jindabyne area. Habitat constraint met - Hollow bearing trees and Hollows > 25cm diameter.	High
Reptiles					
Suta flagellum	Little Whip Snake	-	V	Conservatively included. However, Jindabyne is outside the mapped distribution of records for this species which occur over 35 km to the south east, near Maffra.	High
Varanus rosenbergi	Rosenberg's Goanna, Heath Monitor	-	V	Conservatively included. Termite mounds are a critical habitat component for the species but none are present in the subject land. The species is associated with termites, and mounds are used as nests; (Department of Planning and Environment 2022). Species records are to north of Cooma and Khancoban and therefore the subject land is considered to be outside known distribution of the species.	High

Key: CE = critically endangered, E = endangered, V = vulnerable, M = migratory

4.4.2.2 CANDIDATE THREATENED FAUNA SPECIES – SPECIES CREDIT SPECIES

The list of Candidate threatened fauna species returned from the BAM calculator is provided in Table 4.7. The full threatened species habitat suitability assessment is provided in Appendix A.

Species were removed from the assessment if the geographic or habitat limitations for the species were not met or if the habitat was substantially degraded to the point that a candidate species is unlikely to utilise the development site. All other candidate species were retained for the assessment.

The justification for including or excluding species credit species from the assessment is provided in Table 4.7. The species retained for the assessment are known to use PCT 1191 as habitat so broadly suitable habitat is present in the subject land. Where project timing did not allow targeted surveys to be undertaken in the appropriate season, the species are assumed to be present as outlined in BAM 2020.

There were a number of threatened species returned from the BAM-C that are species credit species if breeding habitat would be impacted. Most of these species identified in Table 4.5 were excluded from the assessment as the subject land does not contain breeding habitat.

There are no species present within the subject land on the basis of being identified on an important habitat map for a species.

There are no threated fauna species SAII entities that would be affected by the proposal.

Table 4.7 Summary of candidate threatened fauna species (species credit species) that were assessed

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Birds									
Anthochaera phrygia	Regent Honeyeater (breeding)	CE	CE	As per mapped areas	None	Excluded as breeding habitat is not present in the subject land. No mapped important areas will be affected (habitat constraint not met).	High	Yes	Excluded.
Callocephalon fimbriatum	Gang-gang Cockatoo (breeding)	-	V	Hollow bearing trees Eucalypt tree species with hollows greater than 9 cm diameter	None	Assumed present. Conservatively included. The subject land contains large trees with potential breeding hollows. Habitat constraints are met.	Moderate	No	Included - assumed present. Excluded from disturbed vegetation zones 1191_B and 1191_C.
Calyptorhynchus lathami	Glossy Black-Cockatoo (breeding)	-	V	Hollow bearing trees Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground.	None	Assumed present. Conservatively included. The subject land contains large trees with potential breeding hollows. Habitat constraints are met.	High	No	Surveyed - not present.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Haliaeetus leucogaster	White-bellied Sea-Eagle (breeding)	M	V	Live large old trees within one kilometre of rivers, lakes, large dams or creeks, wetlands and coastlines and the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period.	None	Included. Habitat constraint met.	High	No	Excluded. There are no large stick nests suitable for White-bellied Sea-Eagle within the subject land.
Hieraaetus morphnoides	Little Eagle (breeding)	-	V	Nest trees - live (occasionally dead) large old trees within vegetation)	None	Excluded. Habitat constraint not met.	Moderate	No	Excluded. No stick nest was recorded within the subject land. Nest site was recorded along Barry Way (approximately 220 m north of the subject land).
Ninox connivens	Barking Owl	-	V	Hollow bearing trees (living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground).	None	Conservatively included as a potential breeding hollows occur in large, tall trees within the subject land. Habitat constraints met.	High	No	Surveyed - not recorded.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Ninox strenua	Powerful Owl	-	V	Hollow bearing trees (living or dead trees with hollows greater than 20 cm diameter).	None	Conservatively included as potential breeding hollows occur in large trees within the subject land. Habitat constraints met.	High	No	Surveyed - not recorded.
Petroica rodinogaster	Pink Robin	-	V	None	None	Conservatively included as the habitat is broadly suitable.	High	No	Surveyed - not recorded.
Mammals									
Cercartetus nanus	Eastern Pygmy-possum	-	V	None	None	Conservatively included as potential breeding hollows occur.	High	No	Assumed present. Excluded from disturbed vegetation zones 1191_B and 1191_C.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Miniopterus orianae oceanensis	Large Bent-winged Bat (breeding)	-	V	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	None	Excluded. Breeding habitat for the Large Bent-winged Bat is highly specific and is restricted to cave systems. There are no caves in or near the subject land. There are no tunnels, mines, culverts or other structures known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave', no records with observation type code 'E nest-roost', no observations with numbers of individuals >500 present in or adjacent to the subject land (habitat constraints not met).	Very High	Yes	Excluded
Myotis macropus	Southern Myotis	-	V	Hollow bearing trees within 200 m of riparian zone, Bridges, caves or artificial structures within 200 m of riparian zone, Waterbodies (this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200 m of the site)	None	Excluded. Species is allocated to species credit because it is dependent on waterways with pools of 3m wide or greater for foraging and habitat surrounding waterways is used for breeding and roosting. No sufficient waterways of 3 m or greater are present on or adjacent to the subject land.	High	No	Excluded.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	HABITAT CONSTRAINT	GEOGRAPHIC LIMITATIONS	JUSTIFICATION FOR INCLUSION / EXCLUSION	SENSITIVITY TO GAIN CLASS	SAII ENTITY	ASSESSMENT OUTCOME
Petauroides volans	Greater Glider	V	-	Hollow bearing trees.	None	Habitat constraint met but the habitat on the subject land is substantially degraded and no records exist in the greater Jindabyne area.	High	No	Surveyed- not recorded
Phascolarctos cinereus	Koala (breeding)	V	V	Presence of koala use trees - refer to Survey Comments field in TBDC.	None.	Included. Koala use trees identified for the Central and Southern Tablelands koala modelling region (State of NSW and Department of Planning and Environment, 2022) including *Eucalyptus pauciflora* and *Eucalyptus rubida* are present. There are no Koala breeding colonies in or near the development site. The subject land does not occur in an area identified as important habitat.	High	No	Surveyed – not recorded.
Reptiles									
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Rocky areas or within 50 m of rocky areas.	None	Excluded. Habitat constraint met. Some small areas of rocky habitat are present but the microhabitats in the subject land are considered to be degraded to the point that the species is unlikely to use the subject land. This is based on past disturbance and disturbed condition of the ground layer.	High	No	Excluded. This species is not known to occur south of Cooma and subject land lacks significant areas of rocky habitat. Habitat is degraded.

Key: CE = critically endangered, E = endangered, V = vulnerable, M = migratory

Figure 4.2a Species habitat areas (flora)

Figure 4.2b Species habitat areas (Gang-gang Cockatoo)

Figure 4.2c Species habitat areas (Eastern Pygmy Possum)

4.5 EPBC ACT LISTED SPECIES

No EPBC listed threatened species were identified on the subject land during field survey. Database searches and field survey identified nine EPBC listed threatened species to have a moderate or higher likelihood of occurring in the subject land (see Appendix A). This includes four species of threatened flora and five species of threatened fauna. These species are addressed below.

For threatened and migratory species listed under the EPBC Act that are considered likely to occur in the subject land, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013) (see Appendix H). The outcome of these significance assessments are that based on the current information we have about these species and the subject land; a significant impact is unlikely, and a referral is not required at this stage. If any of these species were to be found in the subject land during any future targeted surveys the conclusions in Appendix H would need to be reassessed.

4.5.1 LISTED THREATENED FLORA SPECIES

Twenty-one EPBC Act listed threatened flora species, or suitable habitat were identified as either known to occur within the search area, likely to occur within the search area, or may occur within the search area. Of these 21 species, four are considered at least moderately likely to occur in the habitats that are present within the subject land. These species are outlined in Table 4.8. These four species are considered for further assessment. The full habitat assessment is provided in Appendix A which provides details of the inclusion and exclusion of EPBC Act listed flora species from the assessment at this stage.

Table 4.8 EPBC Act listed threatened flora species that are considered moderately likely to occur within the subject land

SCIENTIFIC NAME	COMMON NAME	EPBC ACT	ASSESSMENT
Calotis glandulosa	Mauve Burr-daisy	Vulnerable	Moderately likely to occur based on presence of potential habitat in PCT 1191. Included for assessment.
Leucochrysum albicans var. *tricolor*	Hoary Sunray	Endangered	Moderately likely to occur based on presence of potential habitat in PCT 1191. Included for assessment.
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Moderately likely to occur based on presence of potential habitat in PCT 1191. Included for assessment.
Thesium australe	Austral Toadflax	Vulnerable	Moderately likely to occur based on presence of potential habitat in PCT 1191. Included for assessment..

4.5.2 LISTED THREATENED FAUNA SPECIES

Twenty-four EPBC Act listed threatened fauna species, or suitable habitat were identified as either known to occur within the search area, likely to occur within the search area, or may occur within the search area. This includes nine birds, six mammals, five frogs and four reptiles. Of these 24 species, four are considered at least moderately likely to occur in the habitats that are present within the subject land (see Table 4.9). These four species are considered for further assessment. The full habitat assessment is provided in Appendix A which provides details of the inclusion and exclusion of EPBC Act listed fauna species from the assessment at this stage.

Table 4.9 EPBC Act listed threatened fauna species that are considered moderately likely to occur within the subject land

SCIENTIFIC NAME	COMMON NAME	EPBC ACT	ASSESSMENT
Birds			
Anthochaera phrygia	Regent Honeyeater (foraging habitat)	Critically Endangered	Moderately likely to occur. Included for assessment (potential foraging habitat only).
Hirundapus caudacutus	White-throated Needletail	Vulnerable	Moderately likely to occur. Included for assessment.
Mammals			
Dasyurus maculatus	Spotted-tailed Quoll	Endangered	Moderately likely to occur. Included for assessment.
Phascolarctos cinereus	Koala (foraging habitat)	Vulnerable	Moderately likely to occur. Included for assessment (potential foraging habitat only).

4.5.3 LISTED MIGRATORY SPECIES

Eleven EPBC Act listed migratory species, or suitable habitat were identified as either known to occur within the search area, likely to occur within the search area, or may occur within the search area. These 11 species include migratory marine birds (one species), migratory terrestrial species (four species), and migratory wetlands species (six species). Of these listed migratory species, the following three species outlined in Table 4.10 are considered moderately likely to occur in, or fly over, the subject lands based on the presence of suitable habitats. These three species are considered for further assessment. The full habitat assessment is provided in Appendix A which provides details of the inclusion and exclusion of EPBC Act listed Migratory species from the assessment at this stage.

Table 4.10 EPBC Act listed migratory species that are considered moderately or highly likely to occur within the subject lands

COMMON NAME	SPECIES NAME	EPBC ACT MIGRATORY STATUS	ASSESSMENT
Migratory Marine Birds			
Fork-tailed Swift	*Apus pacificus*	Migratory	Moderately likely to occur. Included for assessment.
Migratory Terrestrial Species			
White-throated Needletail	*Hirundapus caudacutus*	Migratory	Moderately likely to occur. Included for assessment.
Satin Flycatcher	*Myiagra cyanoleuca*	Migratory	Highly likely to occur. Breeding known to occur within PMST search area. Included for assessment.

5 PRESCRIBED IMPACTS

This section identifies prescribed additional biodiversity impacts on threatened entities. Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the Biodiversity Offset Scheme, as per clause 6.1 of the BC Regulation. Prescribed biodiversity impacts are those which may be difficult to quantify, replace or offset, making avoiding and minimising these impacts critical to satisfy the requirements of Section 7 of the BAM (avoiding or minimising impact on biodiversity values).

Prescribed impacts (including direct and indirect impacts) are impacts:

a on the habitat of threatened entities including:
  i karst, caves, crevices, cliffs, rocks and other geological features of significance, or
  ii human-made structures, or
  iii non-native vegetation
b on areas connecting threatened species habitat, such as movement corridors
c that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)
d on threatened and protected animals from turbine strikes from a wind farm (not applicable so not addressed in this BDAR)
e on threatened species or fauna that are part of a TEC from vehicle strikes.

5.1 IMPACTS ON THE HABITAT OF THREATENED ENTITIES

5.1.1 KARST, CAVES, CREVICES, CLIFFS, ROCKS AND OTHER GEOLOGICAL FEATURES OF SIGNIFICANCE

There are no areas of geological significance relating to biodiversity within the subject land. There are no areas of karst, caves, crevices, or cliffs in the subject land. There are some small areas of rocky outcropping within PCT 1191 in the subject land (see Figure 5.1). However, these areas are not significant and are ubiquitous in the landscape. There is an area of Lees Creek to the west of Kosciuszko Road outside of the subject land in the broader assessment area that has a small cliff face that is likely to contain crevices.

No threatened species reliant on rocks as a habitat feature are likely to be impacted by the proposal (see Section 4 and Appendix A). Pink-tailed Worm Lizard, a species returned by the BAM-C as a potential candidate species for assessment is considered unlikely to occur within the subject land as it is not known to occur south of Cooma and the microhabitats within the subject land is considered to be degraded to the point that the species is unlikely to use the subject land.

The extent of impact to rocky habitat is estimated at less than 0.43 ha.

5.1.2 HUMAN-MADE STRUCTURES

The subject lands contain a number of human-made structures. It is likely that some buildings and other structures within the subject lands provide habitat for fauna species. The Sport and Recreation Centre at Jindabyne contains numerous buildings and anecdotal evidence suggests that some buildings are known to contain microbat roosts. However, it is not known whether these buildings are the ones located within the subject land.

There are three houses in the subject land that are currently occupied by staff working at the Sport and Recreation Centre. There is also one standalone metal shed present that is not associated with a house. The location of these buildings is shown in Figure 5.1.

Given that the buildings in the subject land are occupied by people and are not derelict the chances of the buildings being occupied by threatened species such as bats is lower than if the buildings had been abandoned for a length of time. However, there is still a chance that threatened bat species could be using roof cavities or other gaps in the buildings as roosting habitat.

There are two potential candidate species of bat that are known to utilise human-made structures relevant to this assessment: Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Southern Myotis (*Myotis macropus*).

At this stage of the assessment, without targeted surveys being completed, we have assumed that human-made structures could potentially provide habitat for threatened fauna species.

5.1.3 NON-NATIVE VEGETATION

Miscellaneous ecosystems composed of areas of non-native vegetation are known to provide habitat for a range of threatened species that are known to occur or are at least moderately likely to occur in the subject land including Dusky Woodswallow, Gang-gang Cockatoo, Spotted Harrier, Little Eagle, Large Bent-winged Bat, Southern Myotis, Diamond Firetail, and *Calotis glandulosa*. Assessment for these threatened species should include areas of non-native vegetation that provide potential habitat. This would require either targeted surveys to confirm presence/absence, expert report, or assumption of presence.

The impact to non-native vegetation is estimated at approximately 0.52 ha.

5.2 IMPACTS ON AREAS CONNECTING THREATENED SPECIES HABITAT, SUCH AS MOVEMENT CORRIDORS

The subject land is not within any obvious movement corridors for particular species. However, there is the potential for habitat connectivity to be impacted, particularly at the local scale.

Habitat connectivity around the Jindabyne township is patchy due to agricultural and urban development and infrastructure. However, physical and functional connectivity (stepping stones) for more mobile and wide ranging species exists from Lake Jindabyne through the subject land to the forested areas to the west and into the Kosciuszko National Park (see Figure 5.1). This functional connectivity is likely to facilitate movement across species' ranges.

Impacts to aerial species such as birds or bats, particularly species that will readily fly across open areas, are likely to be minimal (e.g. Gang-gang Cockatoo, Dusky Woodswallow, Eastern False Pipistrelle, Large Bentwing-bat, etc.). Likewise, landscape scale impacts to wide ranging terrestrial species (e.g. Spotted-tailed Quoll) are likely to be minimal but the school would introduce a new barrier in the form of new boundary fencing and vegetation would be removed which will have an impact on habitat connectivity at a local scale. The boundary fencing is unlikely to prevent pollination or seed dispersal for any threatened plant species.

5.3 IMPACTS THAT AFFECT WATER QUALITY, WATER BODIES AND HYDROLOGICAL PROCESSES THAT SUSTAIN THREATENED ENTITIES

The proposal has limited potential to impact on water quality, water bodies or hydrological processes that sustain threatened entities. There are no drainage lines within the subject land with the nearest being Lees Creek (identified as a high potential aquatic GDE) located approximately 40 m to the east of the southern boundary of the subject land. PCT 1191 (Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC) is recognised as a low potential GDE.

The extent of impact related to this prescribed impact is expected to be insignificant. An impact to water quality, water bodies and hydrological processes is considered unlikely to occur. Mitigation measures (see Section 8) will ensure there are no impacts to Lees Creek or water quality. The works are limited to above-ground only and there are no activities that would impact groundwater. An impact to water quality, water bodies and hydrological processes is considered unlikely to occur.

5.4 IMPACTS ON THREATENED SPECIES OR FAUNA THAT ARE PART OF A TEC FROM VEHICLE STRIKES

The proposal has the potential to impact on animals through vehicular strike. The construction and operation of the school will introduce more traffic movement to Barry Way and the Sport and Recreation Centre. The extent of vehicular strike cannot be quantified but there may potentially be an increase in road kill to species, particularly macropods, and Gang-gang Cockatoo (species that frequently forage at roadside edges) that are part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC due to increased school traffic.

However, as vehicle speed will be low (40 km/h school zone) the likelihood of vehicle strike to threatened species are lower than that for a high speed road (i.e. 80 km/h) or highway (100–110 km/h).

Species of fauna that are part of the Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC would be affected by the increased traffic movements, particularly the creation of the Southern Connector Road. Examples of the more mobile threatened species that are likely to be impacted by vehicle strike include Little Eagle, Gang-gang Cockatoo, Koala, and Spotted-tailed Quoll.

Figure 5.1 Map of prescribed impact features

6 AVOIDING AND MINIMISING IMPACTS

The following provides information on avoiding and minimising impacts on biodiversity values through the planning and design phase of the Proposal. This information is provided to directly address Chapter 7 of the BAM.

6.1 STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE IMPACTS ON BIODIVERSITY VALUES DURING PROPOSAL PLANNING

In accordance with subsection 7.1.1 and subsection 7.1.2 of the BAM, efforts to avoid and minimise direct and indirect impact on native vegetation and habitat through overall proposal design have been considered. A summary of efforts taken to avoid and/or minimise impacts on native vegetation and associated habitat is addressed in Table 6.1.

Table 6.1 Efforts to avoid and minimise impacts on native vegetation and habitat during proposal planning.

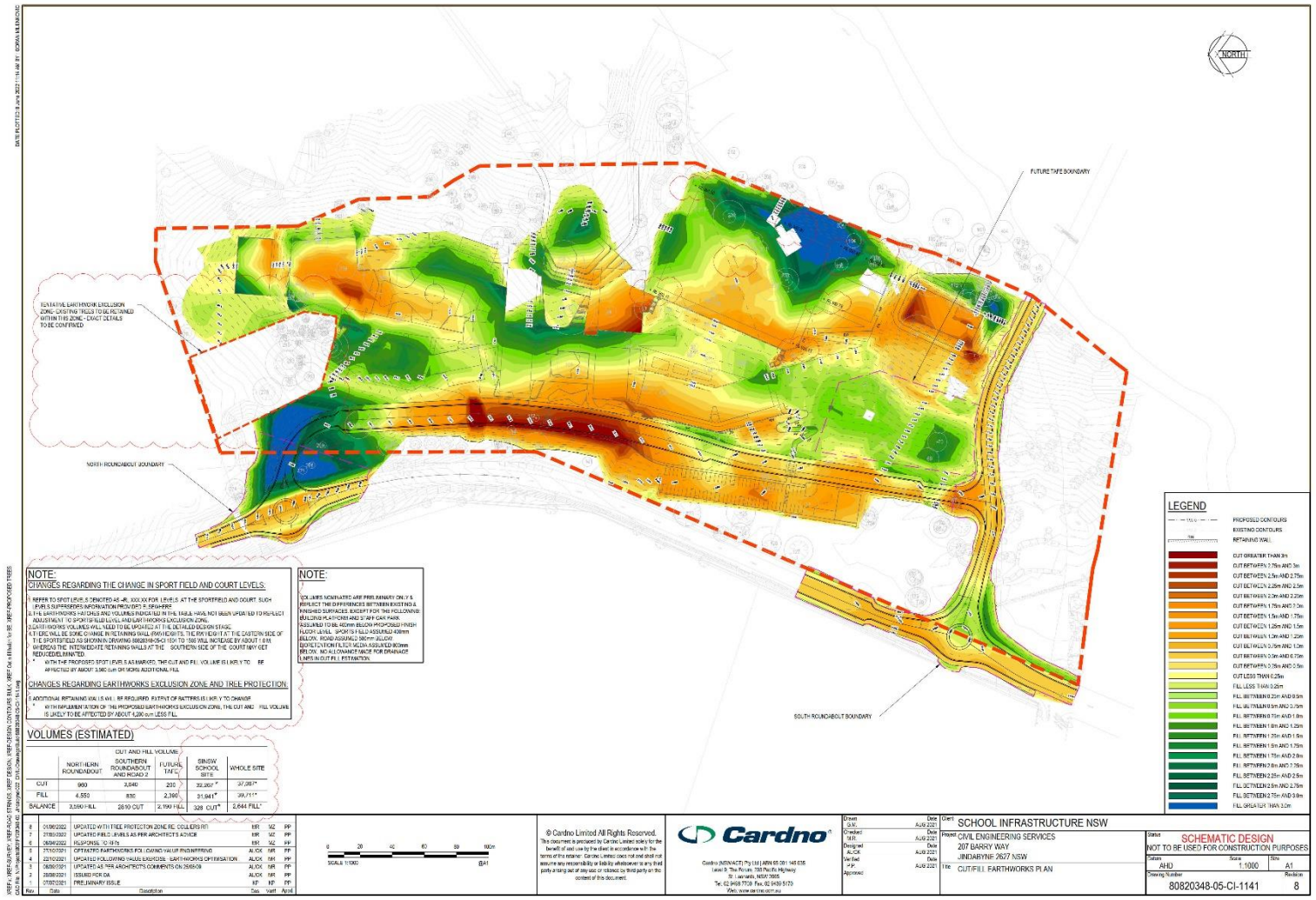
SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
Locate the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat (subsection 7.1.1 of the BAM)	
Knowledge of biodiversity values should inform decisions about the location of the proposal. The initial assessment of biodiversity values from Stage 1 may be used to inform the early planning of the route or location of a proposal.	The proposal is located in a previously disturbed area. A substantial portion of the subject land was formerly used as a golf course (the fairways and greens can be seen on historical aerial photos). Parts of the subject land formerly contained buildings which have been demolished. Parts of the subject land contain houses that are occupied by Sport and Recreation Centre staff. Importantly, the proposal is not located in an area of undisturbed or intact habitat.
Selecting a final proposal location may be an iterative process. Decisions may need to be revisited after all field surveys have been completed.	The current proposal had been designed prior to field surveys for this BDAR. Due to the limited size of the subject land and the scope of the proposal there is limited opportunities for redesign or relocation of the proposal.
Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas: **a** lacking biodiversity values **b** where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low vegetation integrity score) **c** that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.	Importantly, the proposal is located in a previously disturbed area. A substantial portion of the subject land was formerly used as a golf course, parts of the subject land formerly contained buildings which have been demolished, and parts of the subject land contain houses that are occupied by Sport and Recreation Centre staff. While the subject land does not entirely lack biodiversity values, the proposal is not located in an area of undisturbed or intact high-quality habitat. Overall, the subject land is dominated by areas of native vegetation that are in poor condition and areas of grassland that contain a mix of native and exotic species. There are some areas of moderate condition vegetation located in the subject land that would be impacted. The native vegetation within the subject land is PCT 1191 which is part of a TEC and potential habitat for threatened species. The buildings are located in the areas of Poor condition native vegetation or in areas of grassland that contain a mix of native and exotic species.

SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
d outside of the buffer area around breeding habitat features such as nest trees or caves.	Notably the design team recognise the multiple benefits that can be achieved by the retention of mature trees including habitat retention, shade, amenity and aesthetics. The team consequently considered the location of buildings to allow significant tree retention. For example, this defined the move to create a central landscaped plaza through the school campus. While initially indicated with Medium – High retention value, subsequent arborist assessment of these trees eventually led to recommendation for their removal. This recommendation was based on assessment of the tree species, health and structure of the tree, intended use of the spaces around the trees, and consideration of the safety of children. Where significant trees can be retained without any safety concerns (e.g., likely limb failures or compromised structural integrity) these have been retained and the design adjusted to accommodate their retention. Further, where arborist advice has indicated removal is necessary, new trees will be planted with consideration of the landscape context and surrounding use appropriate species and growing conditions will be provided to support healthy replacement trees. Well-considered replacement trees will allow for greater access and integration of the ground plane surrounding. Overall, the proposed landscape design includes significant new tree planting across the site at a replacement ratio of 2:1.
When selecting a proposal's location, all of the following should be analysed. Justification for the decisions in determining the final location must be based on consideration of: **a** alternative modes or technologies that would avoid or minimise impacts on biodiversity values **b** alternative routes that would avoid or minimise impacts on biodiversity values **c** alternative locations that would avoid or minimise impacts on biodiversity values **d** alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.	Applicable to this BDAR is consideration of: — alternative locations that would avoid or minimise impacts on biodiversity values — alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values. The existing JSRC is proposed to be zoned an Education Precinct under provisions of DPIE's Jindabyne SAP. This zoning has been the main driver of locating of the proposal. The proposal is located in a previously disturbed area of the Sport and Recreation Centre. A substantial portion of the subject land was formerly used as a golf course, parts of the subject land formerly contained buildings which have been demolished, and parts of the subject land contain houses that are occupied by Sport and Recreation Centre staff. Notably, while maintaining biodiversity values (i.e., tree retention) was a key design driver in the placement of buildings and the site strategies, other factors required consideration particularly given the intended use of the site as a new Primary and High school in an education campus. These factors included: — providing safe and functional transport solutions that prioritise green travel e.g. buses and walking/ cycling — responding to steep topography with cost effective building construction methodologies and providing DDA compliance to all parts of the site that are able to be accessed (including landscaped spaces)

SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
	— providing large enough grassed level surfaces for play and teaching the PDHPE curriculum including games courts for both schools and a sports field for the High school — creating comfortable, sheltered spaces working with the site's aspect and prevailing winds, and — responding to the bushfire constraints by not locating buildings within the Asset Protection Zone. Despite these considerations, the design has been located such that the highest quality areas of native vegetation and habitat on the Sport and Recreation Centre property will not be impacted by the proposal.
Design the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat (subsection 7.1.2 of the BAM)	
The BDAR must document the reasonable measures taken by the proponent to avoid or minimise clearing of native vegetation and threatened species habitat during proposal design, including placement of temporary and permanent ancillary construction and maintenance facilities. The types of measures that can be used to demonstrate this include: **a)** reducing the proposal's clearing footprint by minimising the number and type of facilities **b)** locating ancillary facilities in areas that have no biodiversity values **c)** locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores) **d)** locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII) **e)** actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	Masterplan options that were considered against multi category criteria (see DJRD Architects, 2020). The chosen option scored highest overall and was considered to respond well to the environmental opportunities and constraints. Significant mature trees would be retained where possible and the entry forecourt and amphitheater have been designed around these trees (Figure 6.1). Cut and fill earthworks plan has also been designed to minimise impacts to biodiversity values, in particular retaining as much of VZ1 woodland in the north of the subject land (Figure 6.2). Section 8 outlines the proposed mitigation for the proposal. A key item is to investigate opportunities to locate site offices, compounds and ancillary facilities in areas of limited biodiversity value (e.g. exotic dominated grassland areas) during detailed design. All native vegetation within the subject land is part of a TEC and a SAII entity (see Section 3 and Section 4). Impacts have been minimised by placing most aspects of the proposal in areas of poorer quality and exotic dominated grassland areas. The design minimises cut and fill to reduce intervention with the landscape and assist tree retention. Further, where significant trees can be retained without any safety concerns (such as likely limb failures or compromised structural integrity) these have been retained and the design adjusted to accommodate their retention. Where arborist advice has indicated removal is necessary, new trees will be planted with consideration of the landscape context and surrounding use appropriate species and growing conditions will be provided to support healthy replacement trees. Overall, the proposed landscape design includes significant new tree planting across the site at a replacement ratio of 2:1. Two key items of the mitigation strategy (see Section 8) is Preparing a vegetation management plan to regulate activity in vegetation and habitats adjacent to the school, and providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat on, or adjacent to, the development to industry best practice and standards.

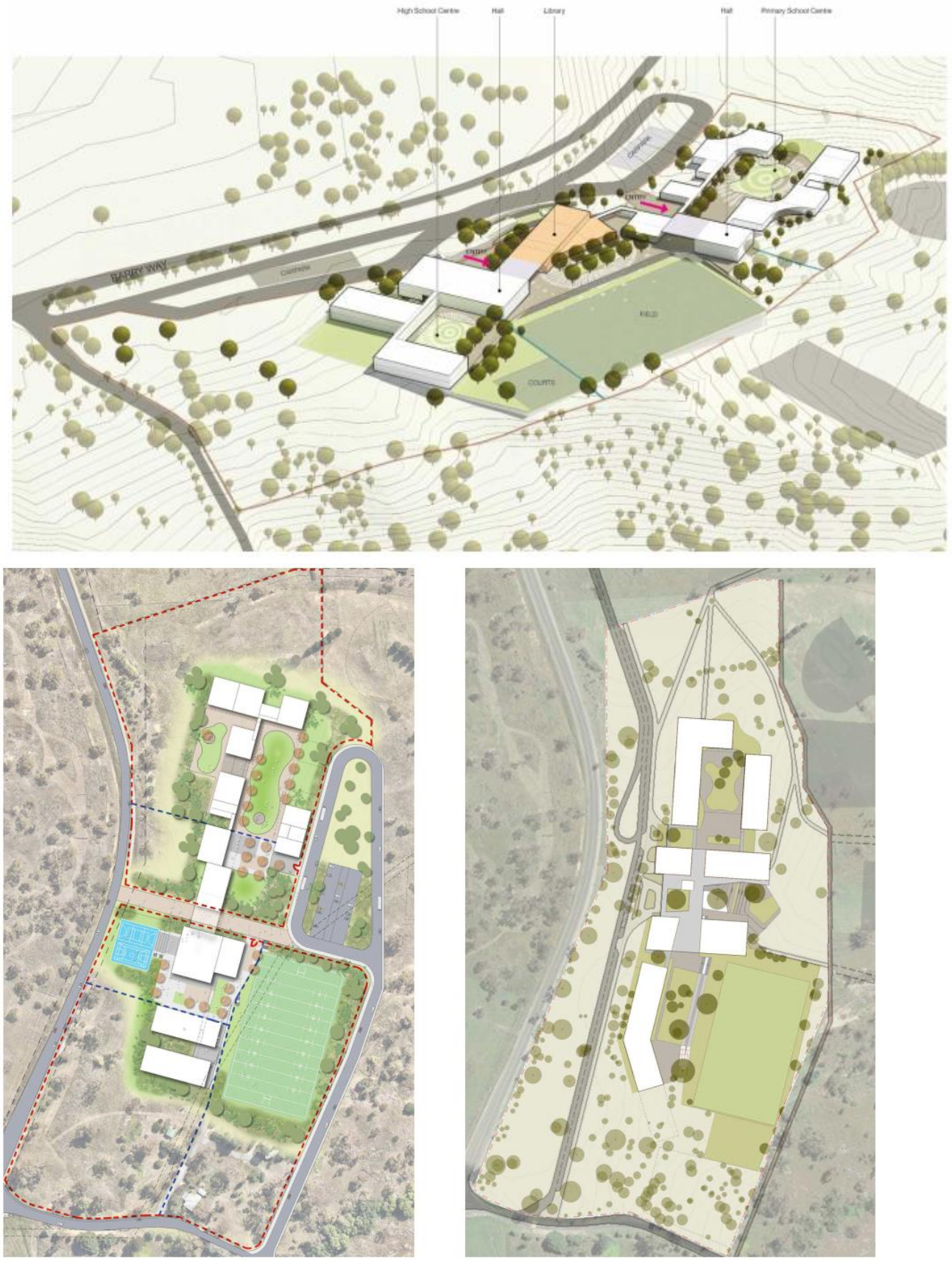
Source: Site Image Landscape Architects

Figure 6.1 Landscape plan showing trees retained



Source: Cardno

Figure 6.2 Cut/fill earthworks plan



Source: DJRD Architects

Figure 6.3 Comparison of Masterplan Option 3 and Option 4

6.2 AVOIDANCE AND MINIMISATION OF IMPACTS ON PRESCRIBED IMPACTS

This section addresses prescribed biodiversity impacts that may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical in accordance with subsection 7.2.1 and subsection 7.2.2 of the BAM. Prescribed biodiversity impacts relevant to the Proposal have been identified in Table 6.2.

Table 6.2 Efforts to avoid and minimise impacts on prescribed biodiversity during proposal design

SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
Locate the proposal to avoid or minimise prescribed biodiversity impacts (subsection 7.2.1 of the BAM)	
To avoid or minimise prescribed biodiversity impacts, the proponent must consider how to: **a** locate surface works to avoid direct impacts on the habitat features identified in Chapter 6 of the BAM **b** locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features identified in Chapter 6 of the BAM **c** locate the proposal to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways **d** optimise the proposal layout to minimise interactions with threatened entities. .	There are no areas of geological significance relating to biodiversity within the subject land. There are no areas of karst, caves, crevices, or cliffs in the subject land. There are some small areas of rocky outcropping within PCT 1191 in the subject land (see Figure 5.1). However, these areas are not significant and are ubiquitous in the landscape. The consequence of the impacts would be minor and non-significant given these rocky areas are ubiquitous in the landscape and no threatened species reliant on rocks as a habitat feature are likely to be impacted by the proposal. There are some buildings in the subject land that would be demolished as part of the proposal. The buildings cannot be retained with the current design. The buildings will be inspected for any roosting bats prior to demolition. If a roost is found it will be managed in accordance with the measures outlined in Section 8. Removal of non-native vegetation cannot be avoided with the current design. Some areas of non-native vegetation, particularly conifers, would potentially result in the loss of foraging habitat for threatened species such as Gang-gang Cockatoo. However, the impact is likely to be negligible given the extent of similar planted vegetation in the assessment area. This impact is likely to be rectified in the short to long-term through amenity plantings. Most threatened species relevant to this assessment will not be significant affected by the impacts to habitat connectivity as they are highly mobile aerial species or wide-ranging terrestrial species. The consequences at the landscape scale are minor, but there would be a local barrier to movement created by new boundary fencing. This impact is unavoidable with the current design. The proposal has not been located in a known wildlife corridor and will not be severing any vegetated movement corridors. The proposal has been located away from waterbodies and waterways, and there are no high potential GDEs in the subject land, so an impact to water quality, water bodies and hydrological processes is considered unlikely to occur. The consequence of vehicle strike is expected to be minor overall. Particular focus would be required during the construction phase to manage vehicle and animal interaction (see Section 8). As an inherent part of the proposal, school zone speed limits (i.e. 40 km/h) will limit the potential for a significant increase in roadkill on Barry Way compared to the current speed limit.

SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
When locating a proposal, the following need to be analysed and justification should be provided for each alternative selected: **a** alternative modes or technologies that would avoid or minimise prescribed impacts **b** alternative routes that would avoid or minimise prescribed impacts **c** alternative locations that would avoid or minimise prescribed impacts **d** alternative sites within a property on which the proposal is located that would avoid or minimise prescribed impacts.	Applicable to this BDAR is consideration of: — alternative locations that would avoid or minimise prescribed biodiversity impacts — alternative sites within a property on which the proposal is located that would avoid or minimise prescribed biodiversity impacts. The existing JSRC is proposed to be zoned an Education Precinct under provisions of DPIE's Jindabyne SAP. This zoning has been the main driver of locating of the proposal. The proposal is located in a previously disturbed area of the Sport and Recreation Centre. A substantial portion of the subject land was formerly used as a golf course, parts of the subject land formerly contained buildings which have been demolished, and parts of the subject land contain houses that are occupied by Sport and Recreation Centre staff. The highest quality areas of native vegetation and habitat on the Sport and Recreation Centre property will not be impacted by the proposal. Avoidance of higher quality areas of native vegetation has resulted in some prescribed biodiversity impacts such as impacts to human-made structures and non-native vegetation. This is considered to be a better outcome for biodiversity than impacts to higher quality areas of native vegetation.
Justifications for a proposal's location should identify any other site constraints that the proponent has considered in determining the location and design of the proposal, such as: **a** bushfire protection requirements, including clearing for asset protection zones **b** flood planning levels **c** servicing constraints.	Masterplan options that were considered against multi category criteria (see DJRD Architects, 2020, Figure 6.1 to 6.4). The chosen option scored highest overall and was considered to respond well to the environmental opportunities and constraints. Significant mature trees would be retained where possible and the entry forecourt and amphitheater have been designed around these trees. Notably, while maintaining biodiversity values (i.e., tree retention) was a key design driver in the placement of buildings and the site strategies, other factors required consideration particularly given the intended use of the site as a new Primary and High school in an education campus. These factors included: — providing safe and functional transport solutions that prioritise green travel e.g. buses and walking/ cycling — responding to steep topography with cost effective building construction methodologies and providing DDA compliance to all parts of the site that are able to be accessed (including landscaped spaces) — providing large enough grassed level surfaces for play and teaching the PDHPE curriculum including games courts for both schools and a sports field for the High school — creating comfortable, sheltered spaces working with the site's aspect and prevailing winds, and — responding to the bushfire constraints by not locating buildings within the Asset Protection Zone.

SUGGESTED MEASURES TO AVOID AND MINIMISE IMPACT	STRATEGIES AND ACTIONS TAKEN TO AVOID OR MINIMISE BIODIVERSITY IMPACTS DURING PROPOSAL PLANNING
	The proposal includes construction of an Asset Protection Zone and it is an integral part of the proposal. The Asset Protection Zone will be located around the perimeter of the school and is set back far from the better-quality vegetation along Lees Creek. There is sufficient room for Asset Protection Zone construction within the subject land. The proposal has been located away from waterbodies and waterways. The proposal is located in a previously disturbed area and is on land currently used as a sport and recreation centre. There are existing buildings and houses within the subject land. As such, there are no servicing constraints making the chosen location appropriate for the proposal.
Design the proposal to avoid or minimise prescribed impacts (subsection 7.2.2 of the BAM)	
Design measures that can avoid or minimise prescribed impacts include: **a** engineering solutions, such as proven techniques to: **i** minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers **ii** restore connectivity and movement corridors **b** design elements that minimise interactions with threatened entities, such as: **i** designing turbines to dissuade perching and minimise the diameter of the rotor swept area **ii** designing fencing to prevent animal entry to transport corridors **iii** providing vegetated buffers rehabilitated with native species **c** maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation **d** maintaining hydrological processes that sustain threatened entities **e** controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.	Section 8 outlines the proposed mitigation for the proposal. A key item is to investigate opportunities to locate site offices, compounds and ancillary facilities in areas of limited biodiversity value (e.g. exotic dominated grassland areas) during detailed design. Impacts to connectivity have been minimised by placing most aspects of the proposal in areas of poorer quality and exotic dominated grassland areas. The design includes areas of vegetation which will contribute to connectivity over time. Two key items of the mitigation strategy (see Section 8) is Preparing a vegetation management plan to regulate activity in vegetation and habitats adjacent to the school, and providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat on, or adjacent to, the development to industry best practice and standards. Hydrological processes that sustain threatened entities will not be impacted by the proposal.

7 ASSESSMENT OF IMPACTS

7.1 ASSESSMENT OF DIRECT IMPACTS

The direct impacts of the proposal have been determined using the information collected in Stage 1 of the BAM (see section 1, 2, 3, 4 and 5 of this BDAR). The direct impacts reported below are based on the final boundary of the proposal at the time of writing and we have considered measures taken to avoid or minimise impacts (see section 6 of this BDAR) as described in Chapter 7 of the BAM. When determining the direct impacts of the proposal we have taken into account the spatial and temporal extent of the impact.

7.1.1 DIRECT IMPACTS ON NATIVE VEGETATION AND THREATENED ECOLOGICAL COMMUNITIES

The direct impact to the PCT 1191 and the Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC is estimated at approximately 2.29 ha (see Table 7.1). The change in vegetation integrity score is outlined in Table 7.1.

Note that for this version of the BDAR these calculations assume a worst-case scenario where the entirety of the subject land is cleared of native vegetation. There are however likely to be areas of native vegetation that are retained, and significant mature trees would be retained where possible as the entry forecourt and amphitheatre have been designed around these trees.

The Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is listed as a Critically Endangered Ecological Community under the BC Act and an entity at risk of a SAII.

Table 7.1 Summary of impacts to native vegetation types, vegetation zones and vegetation integrity loss

PCT	PCT NAME	VEGETATION ZONE	PCT % CLEARED	CORRESPONDING THREATENED ECOLOGICAL COMMUNITY (TEC)	SAII	AREA (HA) IN DEVELOPMENT SITE	VEGETATION INTEGRITY LOSS
PCT 1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1_PCT1191_A	95%	Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion (critically endangered)	Yes	0.80	57.3
		2_PCT1191_B				1.44	4.8
		3_PCT1191_C				0.05	23.8

7.1.2 DIRECT IMPACTS ON THREATENED SPECIES AND HABITAT

The direct impacts on threatened species and habitat are outlined in Table 7.2.

Note that for this version of the BDAR these calculations assume a worst-case scenario where the entirety of the subject land is cleared of native vegetation.

Table 7.2 Summary of direct impacts on threatened species credit species habitat associated with the loss of native vegetation in the development site

SPECIES NAME	COMMON NAME	BC ACT	EPBC ACT	SENSITIVITY TO GAIN CLASS	SAII	HABITAT AREA (HA) IN DEVELOPMENT SITE
Plants						
Calotis glandulosa	Mauve Burr-daisy	Vulnerable	Vulnerable	Moderate Sensitivity to Potential Gain	Yes	0.80 ha (potential habitat)
Leucochrysum albicans var. *tricolor*	Hoary Sunray	Not listed	Endangered	Moderate Sensitivity to Potential Gain	No	0.80 ha (potential habitat)
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Endangered	High Sensitivity to Potential Gain	No	0.80 ha (potential habitat)
Swainsona sericea	Silky Swainson-pea	Vulnerable	Not listed	High Sensitivity to Potential Gain	No	0.80 ha (potential habitat)
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable	Moderate Sensitivity to Potential Gain	No	5.98 ha (potential habitat) (2.29 ha in PCT 1191)
Animals						
Callocephalon fimbriatum	Gang-gang Cockatoo (breeding)	Vulnerable	Not listed	High Sensitivity to Potential Gain	No	Potential breeding habitat trees identified but not confirmed. Preliminary polygon of potential breeding habitat 0.80 ha
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not listed	High Sensitivity to Potential Gain	No	0.80 ha of potential habitat identified.

7.1.3 DIRECT IMPACT TO SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

The Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is listed as a Critically Endangered Ecological Community under the BC Act and is identified as a threatened entity at risk of a Serious and Irreversible Impact (SAII). PCTs consistent with this TEC that are located in the subject land include:

- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

Of the 3.51 ha of the PCT within the subject land, 1.22 ha (35%) would be retained. A total of 2.29 ha of this PCT would be impacted including:

- 0.80 ha of woodland.
- 1.49 ha of derived grassland, of which only 0.05 ha has a VI score greater than 15 and would require offsetting.

Calotis glandulosa (Mauve Burr-daisy), a species that is assumed to be present in the subject land based on the presence of an associated PCT in the form of PCT 1191. In the absence of a targeted survey in the correct season, the only approach to the assessment of *Calotis glandulosa* in the presence of potentially suitable habitat is to assume presence.

The additional impact assessment provisions for threatened ecological communities at risk of an SAII as outlined in Section 9.1.1 of the BAM, and the additional impact assessment provisions for threatened species at risk of an SAII as outlined in Section 9.1.2 of the BAM are addressed in Section 9.1 of this BDAR.

The potential impacts to SAII entities from the proposal are outlined in Table 7.3.

The retained areas will be managed to ensure its biodiversity value is maintained during the operational phase of the school as part of the management of the grounds and would include weed control.

Table 7.3 Potential impacts to SAII entities from the proposal

SAII ENTITY	AREA (HA) IN DEVELOPMENT SITE
Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion	2.29 ha total consisting of: — 0.80 ha of woodland — 1.44 ha of derived grassland with VI score less than 15 — 0.05 ha of derived grassland with VI score greater than 15
Calotis glandulosa (Mauve Burr-daisy)	0.80 ha (potential habitat)

7.2 ASSESSMENT OF INDIRECT IMPACTS

This section outlines the nature, extent, frequency, duration and timing of indirect impacts of the proposal during construction, during operation, and any indirect impacts that may arise from a change in land-use pattern. The consequences of these indirect impacts on biodiversity values are predicted. We detail any limitations to data, assumptions and predictions about impacts on biodiversity.

Table 7.4 below outlined the predicted indirect impacts of the proposal on TECs/PCTs and threatened species and their habitat.

Table 7.4 Indirect impacts of the proposal on TECs/PCTs and threatened species and their habitat

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Inadvertent impacts on adjacent habitat or vegetation	Inadvertent impacts on adjacent vegetation can include a range of indirect impacts including soil disturbance, erosion, sedimentation, enriched run-off and reduced water quality.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. Construction of the proposal has the potential to result in sedimentation and erosion and mobilisation of contaminants within the development footprint and out into adjoining native vegetation, through soil disturbance and construction activities. Sediment laden runoff and spills affect water quality. The mobilisation of sediments would be contained within the development footprint as sediment containment measures would be implemented as part of mitigation measures.	Short term. Limited to construction phase.	Assumes successful implementation of mitigation measures.
Reduced viability of adjacent habitat due to edge effects	Reducing in habitat quality and viability in adjacent areas. This is due to the greater potential for edge effects, habitat fragmentation and barrier effects due to increased perimeter to area ratio.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. The vegetation and habitats within and adjacent to the subject land are already edge habitats without any undisturbed core. There is unlikely to be any further impacts from edge effects resulting from the proposal.	Long term. Construction and operation phases.	Assumes that the small habitat fragments adjacent to the subject land are already subject to a range of edge effects.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Reduced viability of adjacent habitat due to noise, dust or light spill	Considering the existing levels of noise, vibration, dust and light from the adjacent road and housing it is unlikely there would be a significant increase in noise and vibration that would result in any long-term increased impacts to biodiversity within the study area. There is however some potential for impacts to fauna during construction, which may result in fauna temporarily avoiding habitats adjacent to the construction area. Once the school is operation the disturbance caused by human presence will increase.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Moderate. During construction increased levels of noise and dust are likely however these will be short term and mostly associated with vehicle movements, vegetation clearing, access track and road and building construction. A short term increase in construction noise will be mostly limited to daylight hours and is unlikely to have long term adverse effects on the viability of adjacent habitats as they would be short-term in nature only. In terms of increased dust, impacts during construction would likely occur but would be managed with water carts. There would have limited dust generation post construction. Increased vehicle movements would have a short-term increase in localised dust levels, but it is unlikely to be to an extent that would adversely reduce the viability of adjacent habitats.	Long term. Construction and operation phases.	Assumes successful implementation of mitigation measures.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
				The proposal is unlikely to generate light spill to an extent that would adversely reduce the viability of adjacent habitats. Lighting will not be directed at adjacent habitats and is likely to be of a similar level to that of the existing houses. Noise from human presence will increase which could potentially result in impacts to fauna species that avoid human presence.		
Transport of weeds and pathogens from the site to adjacent vegetation	Proliferation of weeds is an indirect impact that is likely to occur during construction and operation, although impacts would be greatest because of vegetation clearing during the construction phase. The most likely causes of weed dispersal and importation include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. The subject land and adjacent habitats contain significant weed growth in the ground layer and no undisturbed weed free habitat exists. As such, weeds must be managed during construction. The presence of some high threat weeds, Priority weed listed under the *Biosecurity Act 2015* and WoNS listed under the National Weeds Strategy requires careful management to ensure spread of these species is limited.	Long term. Construction and operation phases.	Assumes successful implementation of mitigation measures.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Increased risk of starvation or exposure, and loss of shade or shelter	Displacement of resident fauna species during vegetation clearing. Loss of sheltering and foraging habitat.	Not applicable	All threatened species identified in Table 7.2.	Moderate. Displacement of resident fauna species during vegetation clearing is considered likely given the removal of hollow-bearing trees. There may be increased risk of starvation, exposure and loss of shade or shelter to local animals due to habitat removal. Resources would be removed from the subject land so there will be an increase in the risk of starvation or exposure, and loss of shade or shelter. The impact is proportional to the extent of habitat removed.	Long term. Limited to construction phase.	Assumes that the carrying capacity of the subject land for most species is low based on the quality of habitat that is present.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Loss of breeding habitat	Loss of hollow-bearing trees that are likely to be used as breeding habitat. Impact to a buffer zone around a known Little Eagle nest identified as an area essential for breeding.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	Threatened species potentially impacted: — Gang-gang Cockatoo — Barking Owl — Powerful Owl — Little Eagle.	Potentially high if breeding habitat for Gang-gang Cockatoo, Barking Owl or Powerful Owl is present in the subject land. The subject land contains 49 hollow-bearing trees with hollows ranging in size from <5 cm up to 20 cm in size. It is likely that the hollows are used by a range of bird, bat, reptile and arboreal mammal species. Breeding is likely to occur. Removal of these hollow-bearing trees is likely to result in the loss of breeding habitat. Part of the subject land is within 300 m of a known Little Eagle nest. The nest tree itself is not present on the subject land but parts of the subject land are within 300 m of the nest tree and this part of the subject land may be essential for breeding.	Long-term. Construction and operational phase.	The current assessment has identified hollow-bearing trees with hollows that are of a size suitable for Gang-gang Cockatoo, Barking Owl and Powerful Owl. Survey has not been done to prove that breeding is occurring in the subject land or that active nest tree/s. The subject land is at the outer edge of a 300 m buffer around a known Little Eagle nest. The portion of the subject land within the 300 m buffer is relatively poor quality in terms of habitat for this species when the habitat in the remainder of the 300 m nest tree buffer is considered.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Trampling of threatened flora species	Reduction in population extent and available habitat for threatened flora species that occur in the ground stratum.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened plant species identified in Table 7.2.	Limited. Inadvertent trampling of the ground stratum in habitat adjacent to the subject land could occur due to access for storage of unauthorised material, vehicles, plant, and equipment. Potential habitats outside the construction footprint will be identified as no-go areas during construction. Inadvertent impacts such as trampling is considered unlikely.	Long-term. Construction phase.	Assumes successful implementation of mitigation measures.
Inhibition of nitrogen fixation and increased soil salinity	No impact expected. The project does not involve any activities that would inhibit nitrogen fixation or increase soil salinity in adjacent vegetation.	None.	None.	None.	None.	Assumes the project does not involve any activities that would inhibit nitrogen fixation or increase soil salinity in adjacent vegetation.
Fertiliser drift	No impact expected. The project does not involve regular use of fertiliser.	None.	None.	None.	None.	Assumes the project does not involve regular use of fertiliser.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Rubbish dumping	Limited impact expected. The project does not involve creation of any specific circumstances that would increase rubbish dumping into adjacent vegetation besides increased human presence.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. There is the chance of rubbish dumping in adjacent vegetation occurring during construction. There is also the chance of some rubbish dumping occurring during operation as the school is utilised. However, the impacts are likely to be limited due to implementation of mitigation measures during construction. During operation there could be infrequent dumping of rubbish into adjacent vegetation. This would be managed as part of a maintenance regime.	Long-term. Construction and operational phase.	Assumes successful implementation of mitigation measures.
Wood collection	Limited impact expected. The project does not involve creation of any circumstances that would increase wood collection from adjacent vegetation apart from increased human presence.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. There is the chance of wood being collected from adjacent vegetation by children once the school is operational. There is also a chance that people will access the vegetation to collect firewood, but the likelihood of this occurring is likely to be no greater than what is currently experienced. This would be managed as part of a maintenance regime.	Long-term. Operational phase.	Assumes successful implementation of mitigation measures.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Removal and disturbance of rocks, including bush rock	Limited impact expected. The project does not involve creation of any circumstances that would increase removal and disturbance of rocks from adjacent vegetation apart from increased human presence.	PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion. Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC.	All threatened species identified in Table 7.2.	Limited. There is the chance of rocks being collected from adjacent vegetation by children once the school is operational. There is also a chance that people will access the vegetation to collect rocks, but the likelihood of this occurring is likely to be no greater than what is currently experienced. This would be managed as part of a maintenance regime.	Long-term. Construction and operational phase.	Assumes successful implementation of mitigation measures.
Increase in predators	No impact expected. The project does not involve creation of habitats suitable for predators.	None.	None.	None.	None.	The subject land is currently accessed by a range of predators such as foxes and the proposal does not involve any activities that would cause an increase in predators.
Increase in pest animal populations	No impact expected. The project does not involve creation of habitats suitable for pest animals. Pest animals such as deer may actively avoid the school due to human presence.	None.	None.	None.	None.	The subject land already contains a significant population of pest species including rabbits and deer and the proposal does not involve any activities that would cause an increase in pest animal populations.

INDIRECT IMPACT TYPE	NATURE OF IMPACT	TECS/PCTS IMPACTED	THREATENED SPECIES AND THEIR HABITAT IMPACTED	EXTENT OF IMPACT / CONSEQUENCES	DURATION / TIMING OF IMPACT	LIMITATIONS / ASSUMPTIONS MADE
Changed fire regimes	No impact expected. Fire regimes are already highly modified and not further modification is expected.	None.	None.	None.	None.	Assumes the subject land is not currently subject to a fire regime typical of subalpine woodlands.
Disturbance to specialist breeding and foraging habitat (e.g. beach nesting for shorebirds).	No impact expected. No specialist breeding or foraging habitat is present in the development footprint.	None.	None.	None.	None.	Assumes the project does not contain any specialist breeding or foraging habitat that may have been missed during the surveys.

7.3 ASSESSMENT OF PRESCRIBED BIODIVERSITY IMPACTS

This section assesses the prescribed biodiversity impacts on threatened entities. Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the Biodiversity Offset Scheme, as per clause 6.1 of the BC Regulation. Prescribed biodiversity impacts are those which may be difficult to quantify, replace or offset, making avoiding and minimising these impacts critical to satisfy the requirements of Section 7 of the BAM (avoiding or minimising impact on biodiversity values).

Section 5 of this BDAR outlines the prescribed impacts that must be assessed and provides a list of threatened entities that use or are likely to use these habitat features on the subject land and within the surrounding assessment area.

Table 7.5 provides an assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with prescribed impacts (including direct and indirect impacts) including:

a on the habitat of threatened entities including:
- **i** karst, caves, crevices, cliffs, rocks and other geological features of significance, or
- **ii** human-made structures, or
- **iii** non-native vegetation

b on areas connecting threatened species habitat, such as movement corridors

c that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)

d on threatened and protected animals from turbine strikes from a wind farm

e on threatened species or fauna that are part of a TEC from vehicle strikes.

Table 7.5 Assessment of prescribed biodiversity impacts

PRESCRIBED BIODIVERSITY IMPACTS	NATURE (I.E. RELEVANCE TO THE PROPOSAL)	EXTENT	DURATION	CONSEQUENCE
a impacts of development on the habitat of threatened species or ecological communities associated with: **i** karst, caves, crevices, cliffs, rocks and other geological features of significance, or **ii** human made structures, or **iii** non-native vegetation	There are no areas of geological significance relating to biodiversity within the subject land. There are no areas of karst, caves, crevices, or cliffs in the subject land. There are some small areas of rocky outcropping within PCT 1191 in the subject land (see Figure 5.1). However, these areas are not significant and are ubiquitous in the landscape. There are three houses in the subject land that are currently occupied by staff working at the Sport and Recreation Centre. There is also one standalone metal shed present that is not associated with a house. The location of these buildings is shown in Figure 5.1. There are areas of non-native vegetation within the subject land, generally deciduous trees, fruit trees, conifers, and ornamental gardens around the houses. Species such as Gang-gang Cockatoo may feed on the conifers on occasion.	The extent of impact to rocky habitat is estimated at less than 0.43 ha. No threatened species reliant on rocks as a habitat feature are likely to be impacted by the proposal (see Section 4 and Appendix A). Pink-tailed Worm Lizard, a species returned by the BAM-C as a potential candidate species for assessment is considered unlikely to occur within the subject land as it is not known to occur south of Cooma and the microhabitats within the subject land is considered to be degraded to the point that the species is unlikely to use the subject land. Given that the buildings in the subject land are occupied by people and are not derelict the chances of the buildings being occupied by threatened species such as bats is lower than if the buildings had been abandoned for a length of time. However, there is still a chance that threatened bat species could be using roof cavities or other gaps in the buildings as roosting habitat. The impact to non-native vegetation is estimated at approximately 0.52 ha.	The impacts to rocky areas in the subject land will be permanent. If bats are present in the buildings then there would be permanent loss of roosting habitat. Removal of non-native vegetation would be short to long-term. Landscaping works will replace some species in the short term but there will be a time lag until larger trees are established.	The consequence of the impacts would be minor and non-significant given these rocky areas are ubiquitous in the landscape and no threatened species reliant on rocks as a habitat feature are likely to be impacted by the proposal. Buildings will be inspected for any roosting bats prior to demolition. If a roost is found it will be managed in accordance with the measures outlined in Section 8. Removal of non-native vegetation, particularly conifers, would potentially result in the loss of foraging habitat for threatened species such as Gang-gang Cockatoo. However, the impact is likely to be negligible given the extent of similar planted vegetation in the assessment area.

PRESCRIBED BIODIVERSITY IMPACTS	NATURE (I.E. RELEVANCE TO THE PROPOSAL)	EXTENT	DURATION	CONSEQUENCE
b impacts of development on areas connecting threatened species habitat, such as movement corridors	The proposal has the potential to impact on habitat connectivity for threatened species. Habitat connectivity around the Jindabyne township is patchy due to agricultural and urban development and infrastructure. However, physical and functional connectivity (stepping stones) for more mobile and wide ranging species exists from Lake Jindabyne through the subject land to the forested areas to the west and into the Kosciuszko National Park (see Figure 5.1). This functional connectivity is likely to facilitate movement across species' ranges.	Impacts to aerial species such as birds or bats, particularly species that will readily fly across open areas, are likely to be minimal (e.g. Gang-gang Cockatoo, Dusky Woodswallow, Eastern False Pipistrelle, Large Bentwing-bat, etc.). Likewise, landscape scale impacts to wide ranging terrestrial species (e.g. Spotted-tailed Quoll) are likely to be minimal but the school would introduce a new barrier in the form of new boundary fencing and vegetation would be removed which will have an impact on habitat connectivity at a local scale. The boundary fencing is unlikely to prevent pollination or seed dispersal for any threatened plant species.	The impacts to connectivity are expected to be permanent due to habitat removal and new boundary fencing.	Most threatened species relevant to this assessment will not be significant affected by the impacts to habitat connectivity as they are highly mobile aerial species or wide ranging terrestrial species. The consequences at the landscape scale are minor, but there would be a local barrier to movement.

PRESCRIBED BIODIVERSITY IMPACTS	NATURE (I.E. RELEVANCE TO THE PROPOSAL)	EXTENT	DURATION	CONSEQUENCE
c impacts of development that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	The proposal has limited potential to impact on water quality, water bodies or hydrological processes that sustain threatened entities. There are no drainage lines within the subject land with the nearest being Lees Creek (identified as a high potential aquatic GDE) located approximately 40 m to the east of the southern boundary of the subject land. PCT 1191 (Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC) is recognised as a low potential GDE.	The extent of impact related to this prescribed impact is expected to be insignificant. An impact to water quality, water bodies and hydrological processes is considered unlikely to occur. Mitigation measures (see Section 8) will ensure there are no impacts to Lees Creek or water quality. The works are limited to above-ground only and there are no activities that would impact groundwater.	An impact to water quality, water bodies and hydrological processes is considered unlikely to occur.	An impact to water quality, water bodies and hydrological processes is considered unlikely to occur.
d impacts on threatened and protected animals from turbine strikes from a wind farm	Not applicable to this proposal.	Not applicable to this proposal.	Not applicable to this proposal.	Not applicable to this proposal.

PRESCRIBED BIODIVERSITY IMPACTS	NATURE (I.E. RELEVANCE TO THE PROPOSAL)	EXTENT	DURATION	CONSEQUENCE
e the impacts on threatened species or fauna that are part of a TEC from vehicle strikes.	The proposal has the potential to impact on animals through vehicular strike. The construction and operation of the school will introduce more traffic movement to Barry Way and the Sport and Recreation Centre.	The extent of vehicular strike cannot be quantified. There may potentially be an increase in road kill to species, particularly macropods, and Gang-gang Cockatoo (species that frequently forage at roadside edges) that are part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC due to increased school traffic. However, as vehicle speed will be low (40 km/h school zone) the likelihood of vehicle strike to threatened species are lower than that for a high speed road (i.e. 80 km/h) or highway (100–110 km/h).	Long-term. There would be an increase in vehicular movement during construction. However, the largest increase in vehicular movements is expected to be once the school is operational resulting in a significant increase in traffic compared to the existing situation.	The consequence of the impact is expected to be minor overall. Particular focus would be required during the construction phase to manage vehicle and animal interaction (see Section 8). School zone speed limits (i.e. 40 km/h) will limit the potential for a significant increase in road kill on Barry Way compared to the current speed limit.

8 MITIGATION AND MANAGEMENT OF IMPACTS

This chapter describes the environmental management approach and framework for the proposal during construction and operation. This chapter identifies measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:

- techniques, timing, frequency and responsibility
- identifying measures for which there is risk of failure
- evaluating the risk and consequence of any residual impacts
- documenting an adaptive management strategy.

8.1 APPROACH TO MANAGEMENT AND MITIGATION

The environmental management approach has been developed to be consistent with the regulatory requirements for management of biodiversity impacts, identified as likely to be encountered during the construction and operational phases of the proposal. Further details on the environmental management approach for the proposal are provided in the EIS.

Mitigation measures would be implemented during construction to manage the potential impacts of the proposal on biodiversity values. These mitigation measures would be outlined in the Construction Environmental Management Plan (CEMP).

8.2 MITIGATION MEASURES

In addition to the development and implementation of the CEMP, specific mitigation measures have been identified for the proposal. The proposed measures have been identified to manage construction and operational impacts. For construction, the CEMP would specify measures to minimise and manage impacts on biodiversity. It would include (as a minimum):

- measures to minimise impacts to biodiversity, including measures to reduce disturbance to sensitive flora and fauna
- procedures for clearing of vegetation, including pre-clearing inspections and procedures for the relocation of flora and fauna
- procedures for the demarcation and protection of retained vegetation, including vegetation adjacent to construction areas (no go zones)
- weed and pathogen management
- rehabilitation strategies including progressive rehabilitation, and measures for the management and maintenance of rehabilitated areas (including duration)
- procedures for unexpected threatened flora and fauna species finds during construction, including stop work procedures
- monitoring requirements and compliance management.

A biodiversity management plan would also be developed for the operational phase of the school for areas of retained woodland and would include:

- weed control measures
- measures for the management and maintenance of retained woodland areas
- monitoring and adaptive management.

As resident fauna is likely to be displaced (e.g. removal of hollow-bearing trees, home range disruption, connectivity disrupted, construction causing injury or death), measures for mitigating impacts related to the displacement of resident fauna are included.

The proposed mitigation measures are detailed below in Table 8.1.

Table 8.1 Proposed mitigation measures

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B1	The final disturbance area will seek to avoid the clearing of native vegetation and habitats as far as practicable. In particular TECs and habitat for threatened species including hollow-bearing trees.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Detailed design	School Infrastructure NSW Designers	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.
B2	Where native vegetation disturbance activities are required in areas that have not been previously subject to biodiversity survey, additional survey will be carried out prior to works occurring in any such areas and to inform detailed design. These surveys will be carried out by a suitably qualified ecologist.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Detailed design	School Infrastructure NSW	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats updated as necessary.
B3	Opportunities to locate site offices, compounds and ancillary facilities in areas of limited biodiversity value (e.g. exotic dominated grassland areas) will be prioritised during detailed design.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Detailed design	School Infrastructure NSW Designers	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B4	Existing tracks and clearings will be used, where possible, to avoid the construction of new tracks. Where this is not possible, the design will seek to minimise impacts to native vegetation.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Detailed design	School Infrastructure NSW Designers	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.
B5	Pre-clearing surveys will be completed prior to construction by a suitability qualified ecologist. Clearing protocols, including pre-clearing surveys, daily surveys and staged clearing will be implemented, using a trained ecologist or licensed wildlife handler during clearing events.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Pre-construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.
B6	Adoption of clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance. A chainsaw is preferable to heavy machinery to remove native vegetation in any areas where there would only be partial clearing.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Pre-construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B7	Nest boxes will be provided to minimise habitat loss to hollow-bearing fauna (and species that may be living in the buildings) in accordance with a Nest Box Strategy. The strategy will include the following requirements: — hollow-bearing trees will be marked/tagged and mapped in a pre-clearing survey — the size, type, number and location of nest boxes required will be based on the results of the pre-clearing survey — 70 per cent of nest boxes will be installed one month prior to any hollow-bearing vegetation removal, with all nest boxes to be installed within six months from the date of the commencement of clearing.	Threatened species	Pre-construction	School Infrastructure NSW Construction contractor	Moderate. Nest boxes can be effective for some species. However, regular inspection and maintenance is required.	Nest boxes may reduce the impact of hollow loss, but residual impact expected as outlined in Section 7 and 9.
B8	Biodiversity exclusion zones (temporary fencing) for retained vegetation, including any identified habitat for threatened flora populations that have a high susceptibility to trampling and compaction, will be clearly identified by a suitably qualified ecologist prior to the commencement of construction.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Pre-construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B9	Construction workforce will be supplied with sensitive area maps (showing clearing boundaries and exclusion zones) including updates as required. Training of staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.
B10	The predicted clearing of native vegetation by the proposal will be monitored against the recorded clearing to inform any final biodiversity offset requirements within the biodiversity offset package.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.
B11	Timing of works will be such to avoid critical life cycle events, such as breeding or nursing.	Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Breeding periods avoided. Clearing of native vegetation and habitats avoided as far as practicable. Impact to native vegetation and habitats as reported in Section 7 and 9.

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B12	A threatened species unexpected finds protocol will be implemented if threatened flora and fauna species, not assessed in the biodiversity assessment, are identified in the disturbance area.	Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Residual impact would be determined if there were any unexpected finds.
B13	Relocating habitat features (e.g. fallen timber, hollow logs) from the development footprint to adjacent retained vegetation will be undertaken where practicable.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	Relocating habitat features may reduce the impact of removing habitat features, but residual impact expected as outlined in Section 7 and 9.
B14	Hygiene protocols will be implemented to prevent the introduction and/or spread of weeds or pathogens.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Construction	School Infrastructure NSW Construction contractor	High. Known to be effective.	No residual impact expected if hygiene protocols are implemented.

REFERENCE	MITIGATION MEASURE (ACTION)	TARGET	TIMING	RESPONSIBILITY	LIKELIHOOD OF SUCCESS	CONSEQUENCE OF RESIDUAL IMPACT
B15	Preparing a vegetation management plan to regulate activity in vegetation and habitats adjacent to the school. The plan may include controls on rubbish disposal, wood collection, rock collection, fire management, and disturbance to nests and other niche habitats.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Operation	School Infrastructure NSW Maintenance contractor	High. Known to be effective.	No residual impact expected. Outcome should be prevention of rubbish disposal, wood collection, rock collection, inappropriate fire management, and disturbance to nests and other niche habitats.
B16	Providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat on, or adjacent to, the development to industry best practice and standards.	PCT 1191 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion TEC Threatened species	Operation	School Infrastructure NSW Maintenance contractor	High. Known to be effective.	No residual impact expected. Outcome should be restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat on, or adjacent to, the development.

9 IMPACT SUMMARY

9.1 ADDITIONAL IMPACT ASSESSMENT PROVISIONS FOR ECOLOGICAL COMMUNITIES AT RISK OF AN SAII

Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is listed as a Critically Endangered Ecological Community under the BC Act and is identified as a threatened entity at risk of a Serious and Irreversible Impact (SAII). PCTs consistent with this TEC that are located in the subject land include:

- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

A total of 2.29 ha of this community would be impacted including:

- 0.80 ha of woodland
- 1.49 ha of derived grassland, of which only 0.05 ha has a VI score greater than 15 and would require offsetting.

Information on the current status of Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion is provided in Table 9.1. This information has been sourced from the NSW Threatened Biodiversity Data Collection (TBDC) (Department of Planning Industry and Environment 2020) and the final determination for the TEC (NSW Threatened Species Scientific Committee 2019).

Table 9.1 Status assessment of Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion

IMPACT ASSESSMENT PROVISIONS	MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION
a evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	The final determination report for the TEC (NSW Threatened Species Scientific Committee 2019) states: *Monaro Tableland Cool Temperate Grassy Woodland has undergone a very large reduction in distribution. Based on an analysis of maps produced by Gellie (2005) and Keith and Bedward (1999), together with maps depicting more recent vegetation clearing (Danaher 2011) the NSW Threatened Species Scientific Committee estimates that less than 15,660 ha of Monaro Tableland Cool Temperate Grassy Woodland remain, approximately 5% of its estimated pre-1750 distribution of 295,500 ha.* The current total extent of the TEC is not known but is estimated to be less than 15,600 ha. There is little information available about the reduction in extent of the TEC post 1970.

IMPACT ASSESSMENT PROVISIONS	MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION
b extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: **i** change in community structure **ii** change in species composition **iii** disruption of ecological processes **iv** invasion and establishment of exotic species **v** degradation of habitat, and **vi** fragmentation of habitat	The following information has been summarised to support the reduction in ecological function over time: (i) and (ii). The TEC has been subject to stock grazing since the 1820's with significant extensive structural and compositional degradation documented by the middle of the 20th century. Clearing and ring-barking for pastoral activities resulted in a loss of the tree stratum and regeneration was impacted by grazing by rabbits and domestic stock. Grazing also resulted in erosion, compaction and nutrient enrichment of the topsoil leading to degradation of the ground stratum. This resulted in the partial or complete replacement of tussock forming grass species with other grasses, herbs or sub-shrubs. Extensive disturbance to the ground stratum also resulted in the establishment of shrub or bracken thickets in certain areas. (iv) Remnants of the TEC are currently subject to invasion by an extensive range of naturalised plant species not previously known to occur pre-European settlement. These species listed in the final determination report. (v) and (vi) The TEC continues to be subject to a range of threats including (but not limited to) 1) grazing pressure from introduced herbivores combined with native herbivores and domestic stock 2) clearing and degradation of remnants for agricultural, forestry, infrastructure and residential development 3) weed invasion by exotic species 4) changes in rainfall/temperature from human-induced climate change. These threats have contributed to the degradation and fragmentation of the habitat over time and are ongoing, thus likely to cause continuing declines in geographic distribution and disruption of biotic processes or interactions.

IMPACT ASSESSMENT PROVISIONS	MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION
c evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TECs geographic range in NSW according to the: **i** extent of occurrence **ii** area of occupancy, and **iii** number of threat-defined locations	The distribution of Monaro Tableland Cool Temperate Grassy Woodland is highly restricted. (i) According to the final determination (NSW Threatened Species Scientific Committee 2019): *The total extent of occurrence of the community is 13,780 km^2 based on a minimum convex polygon enclosing known occurrences of the community as interpreted in Sections 4.2 – 4.10 and using the method of assessment recommended by IUCN (Bland et al. 2017).* (ii) According to the final determination (NSW Threatened Species Scientific Committee 2019): *The estimated area of occupancy (AOO) is 53 10 km x 10 km grid cells, the scale recommended for assessing AOO by IUCN and applying a minimum occupancy threshold of 1% (Bland et al. 2017).* (iii) The TEC occurs only in one broad area in NSW. The TEC is located between Captains Flat in the north and Bombala in the south. The eastern boundary corresponds approximately with the crest of the Great Dividing Range between Captains Flat and Nimmitabel, with western occurrences between the Adaminaby area in the north and Ingebyra in the south. The majority of occurrences within this broad area are threat-defined locations, as only 1,293 ha of the community currently occurs in the reserve network (<1% of the pre-1750 distribution).
d evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).	According to the 'Guidance to assist a decision-maker to determine a serious and irreversible impacts' (Department of Planning Industry and Environment 2019) Principle 4 (species or ecological community that is unlikely to respond to management and is therefore irreplaceable): '*whether an impact on an entity is considered irreplaceable takes into account two factors… The second factor takes into account consideration of impacts on habitat components that cannot readily be re-created.'* Although the plants of the TEC have the ability to increase in number through seed production and recruitment, the characteristic species of the TEC, particularly the mature tree-stratum Eucalypt species (*E. pauciflora E. rubida subsp. rubida E. stellulata E. viminalis*) may not readily be re-created and offset gain would take considerable time to be realised, if the TEC was removed from the subject land.

The additional impact assessment provisions for ecological communities at risk of an SAII as outlined in Section 9.1.1 of the BAM are addressed here. Actions taken to avoid impacts on threatened ecological communities are listed in Section 6.1.

Table 9.2 SAII impact assessment of Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion

IMPACT ASSESSMENT PROVISIONS	MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION
a impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal: **i** in hectares, and **ii** as a percentage of the current geographic extent of the TEC in NSW. *Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal. The assessor should consider for example, changes to fire regime (frequency, severity), hydrology, pollutants, species interactions (increased competition, changes to pollinators or dispersal), fragmentation, increased edge effects and disease, pathogens and parasites, which are likely to contribute to the loss of flora and/or fauna species characteristic of the TEC	The total clearing of the TEC for the Proposal is estimated at approximately 2.29 ha with only 0.80 ha of this consisting of woodland vegetation. 1.49 ha of the vegetation to be removed consists of derived grassland of which only 0.05 has a VI score greater than 17 and require offsetting. This community occurs only in the Southern Tablelands of NSW. According to the final determination (NSW Threatened Species Scientific Committee 2019) the total extent of the community is estimated to be less than 15,660 ha. The area to be removed by the Proposal therefore represents approximately 0.015% of the total remaining extent of the community. The removal of this vegetation would also result in indirect impacts as a result of shifting of edge effects and weed dispersal resulting in a reduction in the quality or integrity on the edge of the retained areas of the ecological community. However, this not likely to result in the decline or loss of functionally important species or to substantially change the species composition of the retained vegetation. Note that the level of clearing is based on the final boundary of the proposal at the time of writing - these calculations assume a worst-case scenario where the entirety of the subject land is cleared of native vegetation.

IMPACT ASSESSMENT PROVISIONS	MONARO TABLELAND COOL TEMPERATE GRASSY WOODLAND IN THE SOUTH EASTERN HIGHLANDS BIOREGION
b the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by: **i** estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals **ii** describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by: — distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and — estimated maximum dispersal distance for native flora species characteristic of the TEC, and — other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development **iii** describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.	(i) Remnants of the TEC within the relevant development footprint (1500 m buffer in accordance with the BAM 2020) were defined as 'isolated remnants' if they were assessed as > 100 m apart. Eleven isolated remnants were assessed to be retained within the assessment area if the remnant within the subject land was removed. The area for these remnant patches ranged between 0.07 ha – 190 ha. (ii) The average distance between isolated remnants of the community within the assessment area was assessed to be approximately 327.6 m if the remnant within the subject land was retained and 332.6 m if the remnant was removed from the subject land as proposed. Maximum dispersal distance of native characteristic flora species cannot be accurately defined at this stage of assessment due to our limited knowledge of characteristic species within the subject land, as only three days of survey were undertaken. These surveys were conducted during inappropriate seasonal conditions for detecting flora species, including characteristic threatened flora (NSW Threatened Species Scientific Committee 2019). The area to perimeter ratio for remaining areas of the TEC is not considered likely to significantly change as a result of the proposal. (iii) The TEC is consistent with PCT 1191 within the subject land. This PCT is present in the following vegetation zones: **VZ1** (woodland with composition score = 39.5, structure score = 81.9, function score = 66.5), **VZ 2** (derived grassland with composition score = 22.7, structure score = 49.5, function score = 0.1) and **VZ3** (derived grassland with composition score = 24.8, structure score = 54.4, function score = 10)

9.1.1 SUMMARY OF IMPACTS

According to the *Biodiversity Conservation Regulation 2017* (Section 6.7: Principles applicable to determination of "serious and irreversible impacts on biodiversity values"), an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because-:

a it 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

b it 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

c it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or

d the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

The proposal would impact one SAII threatened ecological community 'Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion' listed as Critically Endangered under the BC Act. Approximately 2.29 ha of this community is likely to be removed as a result of the proposed development.

This community is currently highly restricted, occurring only in the Southern Tablelands region of NSW and occupying a total area of less than 15,660 ha. The community is currently under pressure from a range of threats that have been documented to cause decline in the extent and distribution of the community historically, and the ongoing nature of these threats are likely to continue to cause rapid decline in extent, particularly as only 8% of the remaining extent of the community is currently represented in reserve networks. The TEC to be removed within the subject land is characterised by large, hollow-bearing Eucalypt species which are not able to be readily re-created once removed and are likely classify the TEC under the conditions for irreplaceable entities.

9.2 ADDITIONAL IMPACT ASSESSMENT PROVISIONS FOR THREATENED SPECIES AT RISK OF AN SAII

Calotis glandulosa (Mauve Burr-daisy), is a threatened plant species that is considered to be an entity at risk of a SAII and it is assumed to be present in the subject land based on the presence of an associated PCT in the form of PCT 1191. In the absence of a targeted survey in the correct season, the only approach to the assessment of *Calotis glandulosa* in the presence of potentially suitable habitat is to assume presence.

Information on the current population of the species is provided in Table 9.3. This information has been sourced from the NSW Threatened Biodiversity Data Collection (TBDC) (Office of Environment and Heritage 2018), the approved conservation advice for the species (Department of the Environment Water Heritage and the Arts 2008), and the Commonwealth 'Species Profile and Threats Database' (Department of Agriculture Water and the Environment 2021).

Table 9.3 Population assessment of *Calotis glandulosa* (Mauve Burr-daisy)

IMPACT ASSESSMENT PROVISIONS	***CALOTIS GLANDULOSA***
a evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the: **i** decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) or **ii** decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites	There is currently a paucity of information available for this species in regard to rapid decline in population, as extant and historical population size information is not listed. *Calotis glandulosa* can be considered to have a restricted distribution as it is endemic to NSW and is only known to occur in Kosciuszko National Park (NP), Monaro Plain, and three locations in the upper Shoalhaven catchment. There are old and possibly dubious records from near Oberon, the Dubbo area and Mt Imlay. *Calotis glandulosa* has been identified to have the following threats (previously known to contribute to declines in species population): 1) grazing by domestic stock along travelling stock routes, 2) council roadside weed control programs, 3) loss and degradation of habitat and/or populations from roadwork, 3) weed invasion 4) residential and agricultural development 4) (in the Kosciuszko area): habitat degradation and population loss by feral pigs (*Sus scrofa*) (Department of the Environment Water Heritage and the Arts 2008)

IMPACT ASSESSMENT PROVISIONS	*CALOTIS GLANDULOSA*
b evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by: **i** an estimate of the species' current population size in NSW, and **ii** an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and **iii** where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations	There is currently a paucity of information available for this species in regard to current and historical population size and subpopulation details. *Calotis glandulosa* could be considered to have a small population size as spatial searches of NSW Bionet (Department of Planning Industry and Environment 2022) and PlantNet (Royal Botanic Gardens and Domain Trust 2021) result in very few records of the species in total, including a total of approximately 230 records in the past 10 years. All recent records occur within a relatively restricted geographic area, with most records in the far south-eastern corner of the state.
c evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by: **i** extent of occurrence **ii** area of occupancy **iii** number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences) and **iv** whether the species' population is likely to undergo extreme fluctuations	There is currently a paucity of information available for this species in regard to extent of occurrence, area of occupancy, number of threat-defined locations or predicted population dynamics. Known populations of this species are centred around in Kosciuszko National Park (NP) and the Monaro Plain. Three known sites occur in the upper Shoalhaven catchment. The current 'Saving our Species' strategy for *Calotis glandulosa* identifies five current 'priority management sites' for the species (totalling 3,871.3 km). These include: — Back Creek Travelling Stock Reserve in Queanbeyan-Palerang Regional LGA — Kellys Plain in Snowy Monaro Regional LGA — Nungar Plain in Snowy Monaro Regional LGA — Lake Eucumbene area in Snowy Monaro Regional LGA and — Bibbenluke Common in Snowy Monaro Regional LGA. The total population size, extent of occurrence and area of occupancy within these management sites is unknown.

IMPACT ASSESSMENT PROVISIONS	*CALOTIS GLANDULOSA*
d evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because: **i** known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site **ii** the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or **iii** life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Due to the paucity of ecological information available for this species, the likely response of the species to management may not be accurately determined. The species is known to grow in montane grassland, subalpine grassland dominated by *Poa spp*., temperate grassland, *Eucalyptus pauciflora* woodland, and dry sclerophyll forest at high altitude in the Australian Alps, preferring grazing-restricted sites, such as *Themeda triandra* dominated grassland. The species is thought to be a coloniser of disturbed and bare patches. There is no current information available to suggest that the species is unlikely to respond to management, however, given the current limitations in knowledge for the species management implications are uncertain.

The additional impact assessment provisions for threatened species at risk of an SAII as outlined in Section 9.1.2 of the BAM are addressed here. Actions taken to avoid impacts on threatened species are listed in Section 6.1.

Table 9.4 SAII impact assessment of *Calotis glandulosa*

IMPACT ASSESSMENT PROVISIONS	*CALOTIS GLANDULOSA*
a impact on species' population (Principles 1 and 2) presented by: **i** an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and **ii** an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or **iii** if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal	This species has not been recorded in the subject land during survey. As survey was not undertaken during the appropriate seasonal conditions for species detection, the species has been assumed to be present based on the presence of potentially suitable habitat (PCT 1191). As targeted survey has not been completed for the species, the total number of individuals on the subject land and in the impact site is unknown. (iii) the listed unit of measure for *Calotis glandulosa* is area. The estimated number of individuals and impacted individuals on the subject land is currently unknown. Assuming presence of individuals, the total amount of potential habitat that would be impacted by the proposal is 2.3 ha (potential area of habitat in PCT 1191 to be removed).

IMPACT ASSESSMENT PROVISIONS	*CALOTIS GLANDULOSA*
b impact on geographic range (Principles 1 and 3) presented by: **i** the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW **ii** the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted **iii** to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species **iv** to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.	(i) The entirety of the subject land falls within the known distribution of the species (Office of Environment and Heritage 2018). The area of potential habitat impacted by the proposal is estimated to be 2.3 ha. The area of occupancy and extent of occurrence of the species is currently unknown. (ii) The potential number of individuals that would be impacted by the proposal is uncertain as survey was not undertaken during the appropriate seasonal conditions for species detection and the species has been assumed to be present based on the presence of potentially suitable habitat (PCT 1191) (iii) No records have been made for this species within the immediate vicinity of the subject land with the closest record in Jindabyne (~1.7 km away), so it is currently unknown whether a population of the species occurs on the subject land. Several records for the species have been made within the locality so it is possible that the species occurs on the subject land within the soil seedbank. The total area of habitat occupied or required to support a minimum population of the species is currently unknown, given the lack of information available on the species ecological requirements. The habitat within the study area (PCT 1191) is widely available within the locality and broader region, with areas of PCT 1191 to be retained in the immediate vicinity of the subject land. (iv) No populations are currently known to occur within, or adjacent to the subject land as targeted survey during the appropriate season has not been conducted. The removal of 2.3 ha of PCT 1191 representing potential habitat for *Calotis glandulosa* within the subject land occurs at the edge of an existing highway and minor roads and the removal may increase edge effects (such as potential disturbance, weeds, pests) to adjacent retained areas of habitat for the species.

9.2.1 SUMMARY OF IMPACTS

According to the *Biodiversity Conservation Regulation 2017* (Section 6.7: Principles applicable to determination of "serious and irreversible impacts on biodiversity values"), an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because--

a it 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

b it 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

c it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or

d the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

The proposal would impact one SAII threatened species, *Calotis glandulosa*, listed as Vulnerable under the BC Act. Approximately 2.3 ha of potential habitat for this species is likely to be removed as a result of the proposed development. This species was not recorded on the subject land during field surveys, however, as a targeted survey for the species during the appropriate survey season has not been conducted, the only approach to the assessment of *Calotis glandulosa* in the presence of potentially suitable habitat is to assume presence. Little ecological, distributional or population information is currently available for this species. However, given the small number of known areas in which the species occurs, and general paucity of records for the species (i.e. less than 300 records made in the past 10 years), the species could be considered to have a very small population size and limited geographic distribution. Consequently, if the species occurs within the subject land, the removal of individuals and habitat for the proposal may be considered a serious and irreversible impact. In order to conduct an accurate assessment of SAII, appropriate targeted survey for the species recommended.

Figure 9.1 Map of entities at risk of a SAII within the subject land

9.3 IMPACTS FOR WHICH THE ASSESSOR IS REQUIRED TO DETERMINE AN OFFSET REQUIREMENT

9.3.1 IMPACTS ON NATIVE VEGETATION AND TECS (ECOSYSTEM CREDITS)

According to Section 9.2.1 of the BAM, the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

a ≥15, where the PCT is representative of an EEC or a CEEC
b ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community
c ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

An offset is not needed for impacts on native vegetation if the vegetation integrity score is below those listed in Subsection 9.2.1(1) of the BAM; however, if the entity is at risk of an SAII the assessor will need to address the relevant criteria in Section 9.1 and include this in the BDAR.

Vegetation integrity scores of the VZ1 and VZ2 in the subject land are ≥15 and PCT 1191 is representative of a CEEC. As such, an offset for the impacts to PCT 1191 must be determined.

The areas of native vegetation that require offset are illustrated in Figure 3.2.

9.3.2 IMPACTS ON THREATENED SPECIES AND THEIR HABITAT

According to Section 9.2.2 of the BAM, the assessor must determine an offset for the impacts of proposals on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17. The assessor must determine an offset for the impacts of proposals on threatened species that require species credits, identified in accordance with Chapter 5 of the BAM.

Using the BAM-C, an offset requirement has been developed for ecosystem credits and species credits in accordance with the BAM (see Section 10 of this BDAR).

The areas of habitat that require offset for ecosystem credit species (i.e. PCT 1191) are illustrated in Figure 3.2. The areas of habitat requiring offset for species credit species are illustrated in Figure 4.2a to 4.2c.

9.4 IMPACTS NOT REQUIRING OFFSET

There are no impacts to PCTs or threatened species that do not require an offset.

9.5 AREAS NOT REQUIRING ASSESSMENT

In accordance with BAM Section 9.3, areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits. These areas are identified as Miscellaneous ecosystems and are illustrated in Figure 3.2.

10 BIODIVERSITY CREDIT REPORT

A summary of the biodiversity credit requirements for the proposal is provided below. Table 10.1 outlines the ecosystem credit requirement and Table 10.2 outlines the species credit requirements.

Note that for this version of the BDAR a worst case impact scenario of clearing within the entire subject land has been assumed.

For species including *Calotis glandulosa*, *Prasophyllum petilum*, *Swainsona sericea*, and *Thesium australe* the impact and offset requirement assumes that these species are present in the habitats and that all habitat would be removed.

For Gang-gang Cockatoo we have identified trees that may be used as breeding habitat. However, it is important to note that it is unlikely that all, or even most, of these trees will be actual nest trees. A preliminary BAM calculation has been undertaken to provide a worst case scenario which includes wooded vegetation zones within 200m buffer of potential nest trees.

We have not calculated credit requirements for *Leucochrysum albicans* var. *tricolor* because the unit of measure for this species is a count of individuals. Offset cannot be determined without targeted survey and the number of plants within the subject land known. As such, an offset requirement for this species has not been generated for this version of the BDAR as the area of potential habitat for this species cannot be entered into the BAM-C. Targeted surveys are recommended for this species.

Table 10.1 Ecosystem credit summary

PLANT COMMUNITY TYPE	TEC	AREA OF IMPACT (HA)	NUMBER OF CREDITS TO BE RETIRED
PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	2.3 ha	30

Table 10.2 Species credit summary

SPECIES	VEGETATION ZONES NAMES	AREA OF IMPACT (HA)	NUMBER OF CREDITS TO BE RETIRED
Callocephalon fimbriatum / Gang-gang Cockatoo	1191_A	0.80	23
Calotis glandulosa / Mauve Burr-daisy	1191_A, 1191_B, 1191_C	0.80	34
Cercartetus nanus / Eastern Pygmy Possum	1191_A	0.80	23
Prasophyllum petilum / Tarengo Leek Orchid	1191_A	0.80	23
Swainsona sericea / Silky Swainson-pea	1191_A, 1191_B	0.80	23
Thesium australe / Austral Toadflax	1191_A, 1191_B, 1191_C	2.3	21

11 CONCLUSION

11.1 RESULTS

This BDAR has been prepared in accordance with the Biodiversity Assessment Methodology 2020 (BAM) and will support the overarching EIS that will be prepared to address the potential impacts on the environment associated with Proposal.

The was one PCT recorded in the subject land during the survey, Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion PCT (PCT 1191). PCT 1191 was separated into vegetation zones based on broad condition states as outlined in the BAM. There were also areas of non-native vegetation that were classed as Miscellaneous ecosystems (exotic trees/shrubs).

PCT 1191 corresponds to the Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC which is listed as a Critically Endangered Ecological Community under the BC Act. This TEC is identified as a threatened entity at risk of a Serious and Irreversible Impact (SAII). No EPBC Act listed TECs are present in the subject land.

The threatened plant species retained for the assessment after the habitat assessment stage include:

- *Calotis glandulosa*
- *Leucochrysum albicans* var. *tricolor*
- *Prasophyllum petilum*
- *Swainsona sericea*
- *Thesium australe*.

Calotis glandulosa, *Leucochrysum albicans* var. *tricolor*, *Prasophyllum petilum* and *Thesium australe* are listed as threatened species under the EPBC Act.

These threatened plant species are known to occur in PCT 1191 so broadly suitable habitat is present in the subject land. Targeted surveys for these species have not been undertaken so according to the BAM these species are assumed to be present. *Calotis glandulosa* (Mauve Burr-daisy), is a threatened plant species that is considered to be an entity at risk of a SAII and it is assumed to be present in the subject land based on the presence of an associated PCT in the form of PCT 1191.

The subject land contains many large hollow-bearing trees which may be suitable for use as breeding habitat by threatened species including Gang-gang Cockatoo. As a targeted survey for this species has not been undertaken, trees with potential breeding habitat have been mapped. Targeted survey for this species is recommended so that the presence or absence of breeding habitat can be determined in accordance with the BAM and a species polygon can be created if necessary and an accurate offset requirement generated. The subject land does not contain any large stick nests that would be appropriate for use by raptors. However, there is a Little Eagle nest located approximately 220 metres to the north west of the subject land on Lot 1 DP204602.

EPBC Act listed threatened fauna species that are considered moderately likely to occur within the subject land include Regent Honeyeater, White-throated Needletail and Spotted-tailed Quoll.

The Prescribed impacts (including direct and indirect impacts) identified for the proposal include impacts:

- on the habitat of threatened entities including:
  - human-made structures
  - non-native vegetation
- on areas connecting threatened species habitat, such as movement corridors
- on threatened species or fauna that are part of a TEC from vehicle strikes.

These prescribed impacts have been assessed in the BDAR.

11.2 BIODIVERSITY IMPACTS

In accordance with subsection 7.1.1 and subsection 7.1.2 of the BAM, efforts to avoid and minimise direct and indirect impact on native vegetation and habitat through overall proposal design have been considered. However, there is limited scope for avoidance of impacts given the limited area within the subject land for construction of the proposal.

The direct impact to the PCT 1191 and the Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion TEC is estimated at approximately 2.29 ha.

The direct impacts to assumed habitat for the threatened plant species retained for the assessment after the habitat assessment stage include:

- *Calotis glandulosa, Prasophyllum petilum,* and *Swainsona sericea*: 0.80 ha
- *Thesium australe*: 2.3 ha.

The direct impacts to assumed habitat for the threatened animal species retained for the assessment after the habitat assessment stage include:

- Gang-gang Cockatoo (breeding): 0.80 ha potential breeding habitat. Potential nest trees identified but not confirmed.
- Eastern pygmy possum: 0.80 ha (potential habitat).

The direct impact to SAII entities is estimated as follows:

- Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion: 2.3 ha
- *Calotis glandulosa*: 0.80 ha (potential habitat).

In addition to the direct impacts of the proposal a number of indirect impacts were identified including:

- inadvertent impacts on adjacent habitat or vegetation
- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat due to noise, dust or light spill
- transport of weeds and pathogens from the site to adjacent vegetation
- increased risk of starvation or exposure, and loss of shade or shelter
- loss of breeding habitat
- trampling of threatened flora species
- rubbish dumping
- wood collection
- removal and disturbance of rocks, including bush rock.

11.2.1 EPBC ACT SIGNIFICANCE ASSESSMENTS

For threatened and migratory species listed under the EPBC Act that are considered likely to occur in the subject land, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013) (see Appendix H). The outcome of these significance assessments are that based on the current information we have about these species and the subject land; a significant impact is unlikely, and a referral is not required at this stage.

11.3 BIODIVERSITY CREDITS

11.3.1 ECOSYSTEM CREDITS

The ecosystem credit requirement for the proposal is calculated by the BAM-C at 30 credits to be retired for PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

11.3.2 SPECIES CREDITS

For threatened plant species including *Calotis glandulosa, Prasophyllum petilum, Swainsona sericea,* and *Thesium australe* the impact and offset requirement assumes that these species are present in the habitats and that all habitat would be removed. Targeted surveys could be undertaken to decrease or remove the need for these offsets. The species credit requirement for the proposal as calculated by the BAM-C for these species is:

- *Calotis glandulosa*: 34 credits
- *Prasophyllum petilum*: 23 credits
- *Swainsona sericea*: 23 credits
- *Thesium australe*: 21 credits.

For threatened animal species including Gang-gang Cockatoo and Eastern Pygmy Possum, the species credit requirement for the proposal as calculated by the BAM-C for these species is:

- Gang-gang Cockatoo: 23 credits
- Eastern Pygmy Possum: 23 credits

For Gang-gang Cockatoo we have identified trees that may be used as breeding habitat. However, it is important to note that it is unlikely that all, or even most, of these trees will be actual nest trees. As such, the calculation of offset requirement for this species is an overestimate and provides a worst case scenario.

12 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (*WSP*) for Schools infrastructure NSW (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 18 March 2021 and agreement with the Client dated 17 May 2021 (*Agreement*).

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The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

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APPENDIX A

HABITAT ASSESSMENT AND LIKELIHOOD OF OCCURRENCE ASSESSMENT

A1 THREATENED FLORA LIKELIHOOD OF OCCURRENCE ASSESSMENT

Table A.1 Likelihood of occurrence of threatened flora

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Caladenia tesselata	Thick Lip Spider Orchid	V	E	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	BAM-C	Low. Candidate species returned from the BAM-C. There are no existing records of this species from south of Canberra and Braidwood and as such there are no records within the Monaro IBRA subregion. It is considered to have a low likelihood of occurrence. The microhabitats in the subject land are also considered to be degraded to the point that the species is unlikely to use the subject land. This is based on past disturbance and disturbed condition of the ground layer.	Low. Not included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Calotis glandulosa	Mauve Burr-daisy	V	V	The distribution of the Mauve Burr-daisy is centred on the Monaro and Kosciuszko regions. There are old and possibly dubious records from near Oberon, the Dubbo area and Mt Imlay. Found in montane and subalpine grasslands in the Australian Alps. Found in subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area. Appears to be a coloniser of bare patches, which explains why it often occurs on roadsides. Apparently common on roadsides in parts of the Monaro, though it does not persist for long in such sites. Does not persist in heavily-grazed pastures of the Monaro or the Shoalhaven area.	PMST Bionet ALA PlantNet BAM-C	Moderate. Predicted via the PMST and a Candidate species returned from the BAM-C. Known records occur around Jindabyne and habitat present within subject land (PCT 1191).	Moderate. Included as a candidate species for assessment.
Colobanthus curtisiae	Curtis' Colobanth	V	-	Curtis' Colobanth occurs in Tasmania, Victoria and New South Wales. Curtis' Colobanth is found in grassland and grassy woodland. The species can also be found in areas subject to a variety of environmental conditions. It is commonly found on gentle slopes with elevations between 160 m in lowland areas and 1,300 m in alpine areas. The species is found in areas of annual rainfall between 530 mm in the Midlands and 1400 mm on Ben Lomond. Curtis' Colobanth is commonly found on soils derived from sandstone as well as clay loams derived from dolerite and basalt. It can persist in remnant grasslands grazed by stock.	PMST	Low. Predicted via the PMST. Not known from habitats in or near the subject land.	Low. Not included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Commersonia prostrata	Dwarf Kerrawang	E	E	Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands, a larger population in the Thirlmere Lakes area (particularly among the dying reeds at the edge of the water), and on the North Coast (less than 100 plants at the Tomago sandbeds north of Newcastle). It is also found in Victoria. Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E. haemastoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago.	BAM-C	Low. Candidate species returned from the BAM-C. Potential habitat (PCT 1191) occurs on subject land. May be surveyed year round but no individuals found during surveys.	Low. Excluded as a candidate species for assessment based on survey.
Discaria nitida	Leafy Anchor Plant	-	V	The Leafy Anchor Plant is confined to the far south of the Southern Tablelands of NSW and the north-east highlands of Victoria. In NSW the Leafy Anchor Plant grows mostly within Kosciuszko National Park, south from the Blue Water Holes - Yarrangobilly Caves area to south-west of Jindabyne, at altitudes above 900 m. In NSW 18 sites are known with a total population of about 2,800 plants. Generally, it occurs on or close to stream banks and on rocky areas near small waterfalls. The species occurs in woodland with heathy riparian vegetation and on treeless grassy sub-alpine plains. Most populations survive in sites that appear to be rarely burnt "fire refugia".	ALA PlantNet	Low. Records exist close to the subject land (south-west of Jindabyne) but no individuals recorded on subject land and no suitable habitat present.	Low. Not included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Diuris aequalis	Buttercup Doubletail	V	E	The buttercup doubletail has been recorded in Kanangra-Boyd National Park, Gurnang State Forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago and Bungendore. The type location (from the 19th Century) is Liverpool, west of Sydney. However, this and other questionable records from the Sydney metropolitan area are unlikely based on current knowledge of the species.	BAM-C	Low. Candidate species returned from the BAM-C. There is no known habitat for this species or existing records in or near the subject land. A geographic limitation exists for this species: north of Hoskinstown.	Low. Not included as a candidate species for assessment based on geographic limitation.
Diuris ochroma	Pale Golden Moths	V	E	Recorded in south-eastern NSW on the sub-alpine plains of Kosciuszko National Park and the Kybean area. Also recorded in eastern Victoria. Occurs in open grassy woodland of *Eucalyptus viminalis / E. pauciflora* or *E. pauciflora / E. parvula* (or secondary grassland). Also found in sub-alpine grassland.	PMST	Low. Predicted via the PMST. Not known from habitats in or near the subject land.	Low. Not included as a candidate species for assessment.
Dodonaea procumbens	Creeping Hop-bush	V	V	Creeping Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety. Here it occurs mostly in Natural Temperate Grassland or Snow Gum *Eucalyptus pauciflora* Woodland. There is one population at Lake Bathurst (the northern-most occurrence of the species). Here it occurs in adjacent to the lake bed in grassland dominated by Corkscrew Grass *Austrostipa scabra* and Curly Sedge *Carex bichenoviana*. Creeping Hop-bush also occurs in South Australia and Victoria.	PMST BAM-C	Low. Predicted via the PMST and Candidate species returned from the BAM-C. No existing records in or near the subject land. A geographic limitation exists for this species: Cooma-Monaro shire (south of Michelago). Additionally, species can be surveyed year round, but no individuals recorded on subject land during survey.	Low. Not included as a candidate species for assessment based on geographic limitation and survey.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Eucalyptus aggregata	Black Gum	V	V	Black Gum is found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. In NSW it occurs in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts.	BAM-C	Low. Candidate species returned from the BAM-C. There is no known habitat for this species or existing records in or near the subject land. A geographic limitation exists for this species: east of a line that runs north to south about 5 km west of Bungendore.	Low. Not included as a candidate species for assessment based on geographic limitation.
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	E	Paddy's River Box has a moderately restricted distribution. It is currently recorded from the Moss Vale District to Kanangra-Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges of roads and paddocks. It is not well reserved but does occur within Cecil Hoskins Nature Reserve in the Southern Highlands. In Kanangra-Boyd National Park isolated stands occur in the northwest part of the range on the Boyd Plateau. Occurs on grassy woodland on relatively fertile soils on broad cold flats.	BAM-C	Low. Candidate species returned from the BAM-C. No records in or near subject land. Not recorded in subject land during survey or arborist tree mapping	Low. Not included as a candidate species for assessment.
Eucalyptus parvulenta	Silver-leaved Mountain Gum, Silver-leaved Gum	V	V	This species is found in two areas in NSW, from Lithgow to Bathurst and on the Monaro (Bredbo to Bombala). Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhyncha*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (E. *sieberi*) and Apple Box (*E. bridgesiana*).	PMST	Low. Predicted via the PMST. Not known from habitats in or near the subject land. Not recorded on subject land during survey.	Low. Not included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Euphrasia scabra	Rough Eyebright	-	E	There are three extant populations in NSW: Bondi State Forest, South East Forests National Park and near Nunnock Swamp. Total NSW population is between 250 and 500 plants. This number varies with season with few plants appearing in some years. Occurs in or at the margins of swampy grassland or in sphagnum bogs, often in wet, peaty soil.	Bionet PlantNet BAM-C	Low. Candidate species returned from the BAM-C. Recorded in the Jindabyne area but no potential habitat is present on subject land. A habitat constraint exists for this species: montane bog or within 50 m.	Low. Not included as a candidate species for assessment as habitat constraint not met.
Glycine latrobeana	Glycine latrobeana	V	CE	The Clover Glycine is endemic to south-eastern Australia, where it is widely distributed from Port Pirie in South Australia, through much of Victoria to near Hobart in Tasmania. It was recently discovered in Kosciuszko National Park. The Clover Glycine occurs mainly in grassland and grassy woodland habitats, less often in dry forests, and only rarely in heathland. Populations occur from sea level to c. 1,200 m altitude 6 (900 m in Tasmania). The NSW population is in subalpine grassland (at about 1,300 m asl).	PMST	Low. Predicted via the PMST. Restricted to the Sub-alpine dry grasslands and heathlands of valley slopes, southern South Eastern Highlands Bioregion and Australian Alps Bioregion PCT. No suitable habitat for this species is present on the subject land.	Low. Not included as a candidate species for assessment as no suitable habitat present.
Lepidium hyssopifolium	Basalt Pepper-cress	E	E	In NSW, there is a small population near Bathurst, one population at Bungendore, and one near Crookwell. The species was also recorded near Armidale in 1945 and 1958; however, it is not known whether it remains in this area. A specimen collected in the Cooma area about 100 years ago may also be Aromatic Peppercress.	PMST	Low. Predicted via the PMST. Unlikely to occur in the habitat of the subject land as known habitat associations are not present. No records in locality.	Low. Not included as a candidate species for assessment as no habitat present and not known from area.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Leucochrysum albicans var. *tricolor*	Hoary Sunray	E	-	The Hoary Sunray occurs at relatively high elevations in woodland and open forest communities, in an area roughly bounded by Goulburn, Albury and Bega. The species has been recorded in the Yass Valley, Tumut, Upper Lachlan, Snowy River and Galong. It is known from the South Eastern Highlands, Australian Alps and Sydney Basin bioregions.	PMST ALA BAM-C	Moderate Predicted via the PMST and Candidate species returned from the BAM-C. Potential habitat is present in PCT 1191. Previously recorded in locality.	Moderate. Included as a candidate species for assessment.
Pimelea bracteata	Pimelea bracteata	CE	CE	Pimelea bracteata is only known from the Southern Tablelands area of NSW. Occurs in the northern area of Kosciuszko National Park, Scabby Range Nature Reserve, neighbouring State Forests and freehold land. Grows in wetlands and along waterways and stream edges in high altitude treeless subalpine valleys. It can also occur in wet heathland and closed heath.	PMST	Low. Predicted via the PMST. Unlikely to occur in the habitat of the subject land as known habitat associations are not present. No records in locality.	Low. Not included as a candidate species for assessment as no habitat present and not known from area.
Pomaderris pallida	Pale Pomaderris	V	V	Pale Pomaderris has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT and has been recently recorded in eastern Victoria.	PMST	Low. Predicted via the PMST. Unlikely to occur in the habitat of the subject land as known habitat associations are not present. No records in locality.	Low. Not included as a candidate species for assessment as no habitat present and not known from area.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Prasophyllum bagoense	Prasophyllum bagoense	CE	CE	Currently known from a single population on land covered by a Crown Lease on State Forest near Tumbarumba on the Southern Tablelands of NSW. The species occurs over about 12 ha of sub-alpine grassy plain and wetland at an elevation of about 1,100 m. Its distribution may extend into adjacent woodlands. Bago Leek Orchid is a tuberous ground orchid with leaves that normally regenerate from underground tubers each year in spring. Found in grassy, low heathland dominated by *Poa clivicola*, *Epacris gunnii* and *E. celata* on a subalpine plain bordered by Snow Gum and Mountain Gum.	PMST	Low. Predicted via the PMST. This species is only known from the McPhersons Plain area.	Low. Not included as a candidate species for assessment as not known from area.
Prasophyllum petilum	Tarengo Leek Orchid	E	E	Natural populations are known from a total of five sites in NSW. These are near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population c.10 km west of Muswellbrook. It also occurs at Hall in the Australian Capital Territory. This species has also been recorded at Bowning Cemetery where it was experimentally introduced, though it is not known whether this population has persisted.	PMST BAM-C	Moderate. Predicted via the PMST and Candidate species returned from the BAM-C. Potential habitat occurs in subject land in PCT 1191.	Moderate. Included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	In New South Wales, the Blue-tongued Greenhood is known from a few small populations within Kosciuszko National Park and a population of about 40 plants (possibly now extinct) in Bago State Forest and adjoining Crown Leases south of Tumut. The known distribution includes parts of the Snowy River, Tumbarumba and possibly Tumut Local Government Areas. Grows along sub-alpine watercourses under more open thickets of Mountain Tea-tree in muddy ground very close to water. Less commonly grows in peaty soils and sphagnum mounds.	PMST	Low. Predicted via the PMST. No potential habitat occurs on subject land and no records within locality.	Low. Not included as a candidate species for assessment.
Rutidosis leptorrhynchoides	Button Wrinklewort	E	E	Local populations at Goulburn, the Canberra - Queanbeyan area and at Michelago. Other populations occur in Victoria. Occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland or in Natural Temperate Grassland; and often in the ecotone between the two communities.	BAM-C PMST	Low. Candidate species returned from the BAM-C. Potential habitat on subject land in the form of native grasslands. Can be surveyed year-round but not recorded during survey. No records south of Bredbo in NSW.	Low. Excluded as a candidate species for assessment based on survey.
Senecio macrocarpus	Large-fruit Fireweed, Large-fruit Groundsel	V	-	*Senecio macrocarpus* occurs in SA, Victoria and NSW. In NSW, one population has been discovered near Gundaroo. Habitat in NSW includes partly cleared dry forests and box-gum woodlands which transition to Brittle Gum Forest with a relatively undisturbed understorey of native grasses, forbs and subshrubs (Department of Agriculture Water and the Environment 2021).	PMST	Low Predicted via the PMST. Only known from Gundaroo in NSW from partly-cleared box-gum woodland/brittle gum forest. Not known from this area and no suitable habitat exists in subject land.	Low Not included as a candidate species for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Swainsona sericea	Silky Swainson-pea	-	V	Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland. Found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro.	Bionet BAM-C	Moderate. Candidate species returned from the BAM-C. Records exist around Jindabyne (including one record <600 m southwest of subject land). Suitable habitat for this species is present on subject land in the form of native grassland and PCT 1191.	Moderate. Included as a candidate species for assessment.
Thesium australe	Austral Toadflax	V	V	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	PMST BAM-C	Moderate. Predicted via the PMST and Candidate species returned from the BAM-C. This species has known habitat associations (PCT 1191) in the subject land.	Moderate. Included as a candidate species for assessment.
Xerochrysum palustre	Swamp Everlasting	V	-	Swamp Everlasting is endemic to south-eastern Australia, where it is widely distributed from south-eastern New South Wales through Victoria to north-eastern Tasmania. In New South Wales it occurs as far north as the Southern Tablelands and ranges up to about 1,300 m altitude. In Victoria, the species is widely but patchily distributed from the South Australian border to near Bairnesdale, generally below 500 m altitude. Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils.	PMST	Low. Predicted via the PMST. No suitable habitat exists on subject land and there are no records in the locality.	Low Not included as a candidate species for assessment.

A2 THREATENED FAUNA LIKELIHOOD OF OCCURRENCE ASSESSMENT

Table A.2 Threatened fauna likelihood of occurrence assessment

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Birds							
Anthochaera Phrygia	Regent Honeyeater	CE	CE	The Regent Honeyeater that has a patchy distribution between south-east Queensland and central Victoria. It mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (*Casuarina* spp.). It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought.	PMST BAM-C	Moderate. Predicted via the PMST and a Candidate and Predicted species returned from the BAM-C. May occur in PCT 1191. This species has a breeding habitat constraint: as per mapped areas. No breeding habitat mapped in locality.	Moderate. Considered further for assessment as a predicted ecosystem credit species.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	V	The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses.	Bionet BAM-C	Moderate. Predicted species returned from the BAM-C. Habitat for this species is widespread and records of this species are widespread in the region.	Moderate. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Calidris ferruginea	Curlew Sandpiper	CE, M	E	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	PMST ALA	Low. Predicted via the PMST. No wading bird habitat is present.	Low. Not considered further for assessment.
Callocephalon fimbriatum	Gang-gang Cockatoo	-	V	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests with an acacia understorey. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box ironbark assemblages, or in dry forest in coastal areas, occasionally feeding on exotic plant species on urban fringe areas. Favours old growth forest and woodland attributes for nesting and roosting.	PMST ALA BAM-C Bionet	High. Predicted via the PMST and Candidate and Predicted species returned from the BAM-C. PCT 1191 provides suitable habitat for this species including potential breeding hollows in larger trees which are widespread throughout the subject land.	High. Considered further for assessment as a predicted ecosystem credit species and candidate species credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	V	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods.	BAM-C	Low. Predicted and Candidate species returned from the BAM-C. The subject land does not contain any significant foraging resources for this species and no records in the locality. This species has a foraging habitat constraint: presence of *Allocasuarina* and *Casuarina* species.	Low. Not considered further for assessment as a predicted ecosystem credit species or candidate species credit species. Habitat constraint not met.
Circus assimilis	Spotted Harrier	-	V	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	ALA BAM-C	Moderate. Predicted species returned from the BAM-C. Previously recorded in locality and potential habitat in subject land.	Moderate. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	V	Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range.	BAM-C ALA	Moderate. Predicted species returned from the BAM-C. Habitat for this species is available on subject land.	Moderate. Considered further for assessment as a predicted ecosystem credit species.
Daphoenositta chrysoptera	Varied Sittella	-	V	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Nests in an upright tree fork high in the living tree canopy.	ALA BAM-C	Moderate. Predicted species returned from the BAM-C. Habitat for this species is available on subject land and multiple records within locality.	Moderate. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Epthianura albifrons	White-fronted Chat	-	V	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Two isolated sub-populations of White-fronted Chats are currently known from the Sydney Metropolitan Catchment Management Authority (CMA) area; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay. These sub-populations are separated from each other by 25 km of urbanised land, across which the Chats are unlikely to fly. The nearest extant populations outside Sydney Metropolitan CMA are at Ash Island north of Newcastle and Lake Illawarra, south of Wollongong. White-fronted Chats were previously recorded at Penrith Lakes (2001), Hawkesbury Swamps (2002), Tuggerah Lake (1997) and Lake Macquarie (1998).	Bionet ALA	Low. A few records in locality in association with Lake Jindabyne. May have occasional occurrences on subject land but no preferred habitat available.	Low. Not considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Falco hypoleucos	Grey Falcon	V	E	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW.	PMST	Low. Predicted via the PMST. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions. No habitat available in subject land.	Low. Not considered further for assessment.
Glossopsitta pusilla	Little Lorikeet	-	V	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.	BAM-C	Moderate. Predicted species returned from the BAM-C. The vegetation in the subject land may provide some habitat for this species.	Moderate. Considered further for assessment as a predicted ecosystem credit species

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Grantiella picta	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of birds, and almost all breeding, occur on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	PMST	Low. Predicted via the PMST. Little preferred habitat in subject land and no records of species in the locality.	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	V	Distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea).	BAM-C	Moderate. Predicted species and Candidate returned from the BAM-C. This species has a foraging habitat constraint: within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines. Potential habitat for species exists in Lees Creek next to subject land and Lake Jindabyne (E and NE of subject land). Species also has breeding habitat constraint: Live large old trees within one kilometre of rivers, lakes, large dams or creeks, wetlands and coastlines and the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period. No nests attributable to this species were recorded during the survey.	Moderate. Potential for species to forage in the locality. Considered further for assessment as a predicted ecosystem credit species. Excluded as species credit species as no nests on subject land.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Hieraaetus morphnoides	Little Eagle	-	V	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	BAM-C Bionet	High. Predicted species and Candidate returned from the BAM-C. Potential habitat in project subject land. A stick nest was recorded along Barry Way (200 m) north of the subject land.	Known to occur in area and likely to use subject land. Considered further for assessment as a predicted ecosystem credit species and candidate species credit species due to the subject land being within 300 m of a known nest.
Hirundapus caudacutus	White-throated Needletail	V, M	-	The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Most White-throated Needletails spend the non-breeding season in Australasia, mainly in Australia, and occasionally in New Guinea and New Zealand, though it has been suggested that some may overwinter in parts of South-East Asia.	PMST ALA BAM-C	Moderate. Predicted via the PMST and Predicted species returned from the BAM-C. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	Moderate. Considered further for assessment. Likely to fly over the subject lands while in Australia.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Lathamus discolor	Swift Parrot	CE	E	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. Whilst on the mainland the swift parrot disperses widely to forage on flowers and psyllid lerps in eucalypt species, with the majority being found in Victoria and NSW.	PMST ALA	Low. Predicted via the PMST. The mainland migration route is generally to the west of the ranges. Few records exist in the Jindabyne area.	Low. Not a predicted or candidate species returned from the BAM calculator> important habitat not mapped within or in locality of subject land.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	V	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.	BAM-C	Moderate. Predicted species returned from the BAM-C. Habitat for this species occurs on the subject land (though limited structural diversity).	Moderate. Considered further for assessment as a predicted ecosystem credit species.
Neophema pulchella	Turquoise Parrot	-	V	Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	PMST BAM-C Bionet	Moderate. Predicted species returned from the BAM-C. Potential habitat present on subject land in PCT 1191.	Moderate. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Ninox connivens	Barking Owl	-	V	Found throughout continental Australia except for the central arid regions. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas.	BAM-C	Moderate. Predicted and Candidate species returned from the BAM-C. Potential foraging habitat for this species is present on the subject land in PCT 1191. This species has a breeding habitat constraint: hollow bearing trees (living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground). Breeding habitat may be present due to presence of large, tall hollow-bearing trees.	Moderate. Considered further for assessment as a predicted ecosystem credit species and Candidate species credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Ninox strenua	Powerful Owl	-	V	In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.	BAM-C	Moderate. Predicted and Candidate species returned from the BAM-C. Habitat for this species is present on the subject land. This species has a breeding habitat constraint: hollow bearing trees (living or dead trees with hollows greater than 20 cm diameter). Breeding habitat may be present due to presence of large hollow-bearing trees.	Moderate. Considered further for assessment as a predicted ecosystem credit species and Candidate species credit species.
Numenius madagascariensis	Eastern Curlew	CE, M	-	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass.	PMST	Low. Predicted via the PMST. Habitat unsuitable for this species.	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Pachycephala olivacea	Olive Whistler	-	V	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes.	Bionet	Low. Previously recorded in the Jindabyne area but no potential habitat on subject land.	Low. Not considered further for assessment
Petroica boodang	Scarlet Robin	-	V	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and re-growth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. This species' nest is built in the fork of tree usually more than 2 m above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	Bionet BAM-C	Moderate. Predicted species returned from the BAM-C. Previously recorded in locality, including along Lees Creek immediately east of study area. Potential habitat for this species is present on subject land.	Moderate. Known to occur in locality. Considered further for assessment as a predicted ecosystem credit species.
Petroica phoenicea	Flame Robin	-	V	The Flame Robin ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes.	Bionet BAM-C	Moderate. Predicted species returned from the BAM-C. Previously recorded in locality, including along Lees Creek immediately east of study area. Potential habitat for this species is present on subject land.	Moderate. Known to occur in locality. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Petroica rodinogaster	Pink Robin	-	V	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	BAM-C	Moderate. Candidate species returned from the BAM-C. Potential habitat on subject land for dispersing birds outside of breeding season.	Moderate. Considered further for assessment as a candidate species credit species.
Polytelis swainsonii	Superb Parrot	V	V	The Superb Parrot occurs in south-eastern Australia where it occurs on inland slopes of the Great Divide and its adjacent plains. It mainly utilises eucalypt forests and woodland especially areas along river systems which consist of *Eucalyptus camaldulensis* (River Red Gum), *E. melliodora* (Yellow Box) and E. macrocarpa (Grey Box).	PMST	Low. Predicted via the PMST Preferred habitat not present on subject land and no records within locality. Species may be considered vagrant.	Low. Not considered further for assessment at this stage.
Rostratula australis	Australian Painted Snipe	E, M	E	Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	PMST	Low. Predicted via the PMST. Habitat unsuitable for this species.	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Stagonopleura guttata	Diamond Firetail	-	V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	PMST Bionet BAM-C ALA	Moderate. Predicted species returned from the BAM-C. Habitat for this species is present on subject land in PCT 1191.	Moderate. Considered further for assessment as a predicted ecosystem credit species.
Chthonicola sagittata	Speckled Warbler	-	V	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. Lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.	BAM-C	Moderate. Predicted species returned from the BAM-C. Habitat for this species is present on subject land in PCT 1191.	Moderate. Considered further for assessment as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Frogs							
Litoria booroolongensis	Booroolong Frog	E	E	Restricted to tablelands and slopes in NSW and north-eastern Victoria at 200-1300 m above sea level, predominantly along the western-flowing streams and their headwaters of the Great Dividing Range. Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge	ALA	Low. Subject land does not occur within species known or predicted distribution (DPIE). Preferred habitat is not present on subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.
Litoria aurea	Green and Golden Bell Frog	V	E	Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range; however, they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available.	Bionet ALA	Low. Not recorded in locality since 1960's. Preferred habitat not present on subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Litoria castanea	Yellow-spotted Tree Frog	CE	CE	Historically, this species occurred in two separate highland ranges: on the New England Tableland, and on the southern and central tablelands from Bathurst to Bombala. Following the chytrid virus pandemic in the 1970s, this species went unrecorded for 30 years and was believed to be extinct, until it was rediscovered in 2009 on the Southern Tablelands. This population - near Yass - remains the only known extant site of the species. Require large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation.	PMST	Low. Returned from the PMST search. No suitable habitat or associated PCTs are present in the subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.
Litoria raniformis	Southern Bell Frog	V	E	The species is currently widespread throughout the Murray River valley and has been recorded from six Catchment Management Areas in NSW: Lower Murray Darling, Murrumbidgee, Murray, Lachlan, Central West and South East. Found mostly amongst emergent vegetation, including *Typha* sp. (bullrush), *Phragmites* sp. (reeds) and *Eleocharis* sp.(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams.	PMST ALA	Low. Returned from the PMST search. There are isolated records of this species from Jindabyne, but no potential habitat is present on subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Litoria verreauxii alpina	Alpine Tree Frog	V	E	The Alpine Tree Frog occurs in the south-eastern NSW and Victorian high country (alpine and sub-alpine zones) generally above 1100 m asl. Most locations are within National Park and some are close to alpine resorts. Found in a wide variety of habitats including woodland, heath, grassland and herb fields. Breed in natural and artificial wetlands including ponds, bogs, fens, streamside pools, stock dams and drainage channels that are still or slow flowing. It does not climb well and spends most of its time on the ground.	PMST ALA	Low. Returned from PMST search. No potential habitat is present on subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.
Mammals							
Burramys parvus	Mountain Pygmy-possum	E	E	The Mountain Pygmy-possum lives only in alpine and subalpine areas on the highest mountains of Victoria and NSW. In NSW, the entire range is in a 30 km by 8 km area of Kosciuszko National Park between Thredbo and Kerries Ridge, where it occupies less than four square km of habitat. The total population size is less than 500 adults. Two of the four main sub-populations in NSW are found within ski resort areas. Lives on the ground in rocky areas where boulders have accumulated below mountain peaks; frequently associated with alpine heathland shrubs dominated by the Mountain Plum-pine (*Podocarpus lawrencei*).	PMST	Low Predicted via the PMST. No potential habitat occurs on subject land.	Low. No potential habitat occurs on subject land. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Cercartetus nanus	Eastern Pygmy-possum	-	V	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; soft fruits are eaten when flowers are unavailable.	BAM-C ALA	Moderate. Candidate species returned from the BAM-C. Potential habitat available in PCT 1191 but very little shrub layer present. The habitat in the subject land is substantially degraded to the point that the candidate species is unlikely to utilise the subject land.	Moderate. Assumed present. Excluded from disturbed vegetation zones 1191_B and 1191_C as these vegetation zones do not provide suitbale resources..
Dasyurus maculatus	Spotted-tailed Quoll	E	V	Wet and dry sclerophyll forests and rainforests, and adjacent open agricultural areas. Generally associated with large expansive areas of habitat to sustain territory size. Requires hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	PMST BAM-C	Moderate. Predicted by the PMST and Predicted species returned from the BAM-C. Habitat on subject land is degraded and no substantial foraging opportunities on subject land but species may occur through area on occasion.	Moderate. Preferred habitat is not available on subject land but may occur on occasion. Included as predicted ecosystem credit species for assessment.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	V	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings.	BAM-C	Moderate. Predicted species returned from the BAM-C. Potential foraging habitat on subject land.	Moderate. This species is included in the assessment at this stage as a predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Mastacomys fuscus	Broad-toothed Rat	V	V	In NSW the Broad-toothed Rat occurs in two widely separated areas: the wet alpine and subalpine heaths and woodlands in Kosciuszko National Park, adjacent Nature Reserves (Bimberi and Scabby NR) and State Forest (Buccleuch SF) in the south of the State, and on the Barrington Tops, north-west of Newcastle. In Victoria - South Gippsland and the Otways - and western Tasmania, it can be found in wet sedge and grasslands at lower elevations. The Broad-toothed Rat lives in a complex of runways through the dense vegetation of its wet grass, sedge or heath environment, and under the snow in winter.	PMST	Low. Predicted via the PMST. No potential habitat occurs on subject land.	Low. Preferred habitat is not available on subject land. Not considered further for assessment.
Miniopterus orianae oceanensis	Large Bentwing-bat	-	V	Occurs on east and north west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other manmade structures.	Bionet BAM-C	Moderate. Candidate and Predicted species returned from the BAM-C. PCT 1191 may be used as foraging habitat. This species has breeding habitat constraints and no breeding habitat occurs in subject land.	Moderate. Foraging habitat likely to be present. Breeding habitat constraints not met. Included in assessment as predicted ecosystem credit species.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Myotis macropus	Southern Myotis	-	V	Generally roost in groups close to water in caves, mine shafts, hollow-bearing trees, and storm water channels, buildings, under bridges and in dense foliage. Forages over streams and pools catching insects and small fish.	Bionet BAM-C	Low. Candidate species returned from the BAM-C. This species has habitat constraints: (1) Hollow bearing trees within 200 m of riparian zone, (2) Bridges, caves or artificial structures within 200 m of riparian zone, (3) Waterbodies (this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site). Habitat on subject land was substantially degraded to the point that the candidate species is unlikely to utilise the site (i.e. no 3 m wide water bodies as required under the BAM).	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Petauroides volans	Greater Glider	V	-	The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from north east Queensland to the Central Highlands of Victoria from sea level to 1200 m altitude. It feeds exclusively on eucalypt leaves, buds, flowers and mistletoe and favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. It roosts in tree hollows, with a particular selection for large hollows in large, old trees.	PMST BAM-C	Low. Predicted via the PMST, Candidate species returned from the BAM-C. Habitat on subject land substantially degraded and no records in the greater Jindabyne area..	Low. Conservatively considered further for assessment.
Petaurus australis	Yellow-bellied Glider	-	V	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.	BAM-C	Low. Predicted species returned from the BAM-C. Habitat on subject land substantially degraded and no records in the greater Jindabyne area.	Low. Conservatively considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	PMST Bionet BAM-C	Low. Predicted species returned from the BAM calculator and PMST. Potential foraging habitat is present in the subject land with the presence of secondary feed tree species *Eucalyptus rubida* and *Eucalyptus pauciflora*.	Low. No approved KPoM for LGA, no core koala habitat present, no records since 1950 within locality, no evidence of Koalas or 'highly suitable habitat' detected during survey. Excluded from assessment as a species credit species as no breeding habitat is present. Dispersing animals may utilise the subject land on rare occasion.
Pseudomys fumeus	Smoky Mouse	E	CE	The Smoky Mouse is currently limited to a small number of sites in western, southern and eastern Victoria, south-east NSW and the ACT. The Smoky Mouse appears to prefer heath habitat on ridge tops and slopes in sclerophyll forest, heathland and open-forest from the coast (in Victoria) to sub-alpine regions of up to 1800 m, but sometimes occurs in ferny gullies.	PMST	Low. Predicted via the PMST. Lack of preferred habitat in subject land and not known to occur within the locality.	Low. Lack of preferred habitat and not known to occur. Not considered further.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Reptiles							
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	The Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra / Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland areas with a predominantly native grassy groundlayer, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	BAM-C	Low. Candidate species returned from the BAM-C. Not known to occur south of Cooma and the habitat was substantially degraded to the point that the candidate species is unlikely to utilise the subject land.	Low. Lack of preferred habitat and not known to occur. Not considered further.
Cyclodomorphus praealtus	Alpine She-oak Skink	E	E	Species is endemic to NSW and Victoria, where it is restricted to sub-alpine and alpine grasslands. In NSW, the Alpine She-oak Skink has only been observed within Kosciuszko National Park between Smiggin Holes and Kiandra. Inhabits tree-less or very lightly treed areas that contain tussock grasses, low heath or a combination of both. Within this habitat the species shelters beneath litter, rocks, logs and other ground debris, and has been observed basking on grass tussocks. In NSW, Alpine She-oak Skinks have been observed in alpine to sub-alpine grasslands in flat to gently sloping areas.	PMST	Low. Predicted via the PMST. Lack of preferred habitat in subject land and not known to occur within the locality.	Low. Lack of preferred habitat and not known to occur. Not considered further.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Delma impar	Striped Legless Lizard	V		The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	PMST	Low. Predicted via the PMST. Small areas of potential habitat in subject land but not known to occur within the locality, with closest known locality >50 km away	Low. Limited preferred habitat and not known to occur in locality. Not considered further.
Suta flagellum	Little Whip Snake	-	V	The Little Whip Snake is found within an area bounded by Crookwell in the north, Bombala in the south, Tumbarumba to the west and Braidwood to the east. Occurs in Natural Temperate Grasslands and grassy woodlands, including those dominated by Snow Gum *Eucalyptus pauciflora* or Yellow Box *E. melliodora*. Also occurs in secondary grasslands derived from clearing of woodlands.	BAM-C	Low. Predicted species returned from the BAM-C. Habitat on was substantially degraded to the point that the candidate species is unlikely to utilise the subject land (little rock cover present).	Low. Considered in assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Varanus rosenbergi	Rosenberg's Goanna, Heath Monitor	-	V	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	BAM-C	Low. Predicted species returned from the BAM-C. Habitat on was substantially degraded to the point that the candidate species is unlikely to utilise the subject land..	Low. Lack of termite mounds which are a critical habitat component.

A3 LIKELIHOOD OF OCCURRENCE OF MIGRATORY SPECIES

Table A.3 Likelihood of occurrence of migratory species

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Actitis hypoleucos	Common Sandpiper	M	-	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	PMST	Low. Predicted via the PMST. No wading bird habitat is present.	Low. Not considered further for assessment.
Apus pacificus	Fork-tailed Swift	M	-	Recorded in all regions of NSW. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher.	PMST	Moderate. Predicted via the PMST. Almost exclusively aerial.	Moderate. Likely to fly over the subject lands during migration.
Calidris acuminata	Sharp-tailed Sandpiper	M	-	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	PMST	Low. Predicted via the PMST. No wading bird habitat is present.	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Calidris ferruginea	Curlew Sandpiper	CE, M	E	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	PMST	Low. Predicted via the PMST. No wading bird habitat is present.	Low. Not considered further for assessment.
Calidris melanotos	Pectoral Sandpiper	M	-	In New South Wales (NSW), the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST	Low. Predicted via the PMST. No wading bird habitat is present.	Low. Not considered further for assessment.
Gallinago hardwickii	Latham's Snipe	M	-	Recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.	PMST	Low. Predicted via the PMST. No potential habitat on subject land.	Low. Not considered further for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Hirundapus caudacutus	White-throated Needletail	V, M	-	The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Most White-throated Needletails spend the non-breeding season in Australasia, mainly in Australia, and occasionally in New Guinea and New Zealand, though it has been suggested that some may overwinter in parts of South-East Asia.	PMST BAM-C	Moderate. Predicted via the PMST and Predicted species returned from the BAM-C. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	Moderate. Considered further for assessment. Likely to fly over the subject lands while in Australia.
Numenius madagascariensis	Eastern Curlew	CE, M	-	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass.	PMST	Low. Predicted via the PMST. Habitat unsuitable for this species.	Low. Not considered further for assessment.
Motacilla flava	Yellow Wagtail	M	-	Rare but regular visitor around Australian coast, especially in the NW coast Broome to Darwin. Found in open country near swamps, salt marshes, sewage ponds, grassed surrounds to airfields, bare ground; occasionally on drier inland plains.	PMST	Low. Predicted via the PMST. Habitat unsuitable for this species.	Low. Not considered further for assessment.
Myiagra cyanoleuca	Satin Flycatcher	M	-	Widespread in eastern Australia and vagrant to New Zealand. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	PMST	High. Predicted via the PMST. Breeding known to occur within PMST search area.	Highly likely to occur. Included for assessment.

SPECIES NAME	COMMON NAME	EPBC ACT	BC ACT	DISTRIBUTION AND HABITAT	DATA SOURCE	HABITAT SUITABILITY	LIKELIHOOD OF OCCURRENCE
Rhipidura rufifrons	Rufous Fantail	M	-	Occurs in coastal and near coastal districts of northern and eastern Australia. In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns.	PMST	Low. Predicted via the PMST. Species or species habitat known to occur within PMST search area. No potential habitat on subject land.	Low. Not included for assessment.
Distribution and habitat requirement information adapted from Australian Government Department of Agriculture, Water and the Environment SPRAT http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl and NSW Department of Planning, Industry and Environment Threatened Species Data Collection https://www.environment.nsw.gov.au/threatenedspeciesapp/ Key: CE = critically endangered, V = vulnerable, M = Migratory							

APPENDIX B

BAM FLORISTIC SURVEY COMPOSITION AND STRUCTURE DATA

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther
P3	1191	0.8	101	A	55	644389	5967294	85	3	1	4	7	0	1	40.4	1	45.3	11.1	0	0.1
P5	1191	0.8	101	A	55	644470	5967145	20	2	0	3	10	0	0	20	0	61	1.9	0	0
P6	1191	0.8	101	A	55	644385	5967009	355	2	1	5	8	0	0	20	1.5	66.2	0.8	0	0
CBark1	1191	0.8	101	A	55	644304	5967075	188	2	1	5	7	0	1	10.5	0.2	10.5	0.8	0	0.1
Cbark 1A	1191	0.8	101	A	55	644438	5967246	190	1	0	5	5	0	0	10	0	38.2	1.4	0	0
3A	1191	0.8	101	A	55	644397	5967281	85	2	1	7	6	0	0	6	1	65	20.7	0	0
5A	1191	0.8	101	A	55	644473	5967146	20	2	0	5	7	0	0	14	0	51.7	2.6	0	0
P2	1191	1.44	101	B	55	644421	5967335	67	0	0	7	4	0	0	0	0	76.7	0.6	0	0
P2A	1191	1.44	101	B	55	644423	5967334	69	0	0	10	3	0	0	0	0	83.6	0.3	0	0
P4A	1191	1.44	101	B	55	644360	5967206	7	0	0	5	4	0	0	0	0	53.4	6.2	0	0
P8A	1191	0.05	101	C	55	644309	5966964	4	1	0	7	4	0	0	1	0	37.6	6	0	0

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic
P3	1191	0.8	101	A	55	644389	5967294	85	3	3	72	12	1	1	1	1	1	1	0.2
P5	1191	0.8	101	A	55	644470	5967145	20	3	2	19	14	1	1	1	1	1	1	0.4
P6	1191	0.8	101	A	55	644385	5967009	355	1	1	18	0	1	1	1	0	0	1	0.3
CBark1	1191	0.8	101	A	55	644304	5967075	188	2	2	10	5	0	1	1	0	0	0	0
Cbark 1A	1191	0.8	101	A	55	644438	5967246	190	3	1	0.6	0	0	0	0	0	0	1	0
3A	1191	0.8	101	A	55	644397	5967281	85	1	1	7.8	10	1	1	1	1	1	1	0.2
5A	1191	0.8	101	A	55	644473	5967146	20	3	2	1.8	3	1	1	1	1	1	1	0.5
P2	1191	1.44	101	B	55	644421	5967335	67	0	0	11	0	0	0	0	0	0	0	0.1
P2A	1191	1.44	101	B	55	644423	5967334	69	0	0	0	0	0	0	0	0	0	0	0.5
P4A	1191	1.44	101	B	55	644360	5967206	7	0	0	0.6	0	0	0	0	0	0	0	5
P8A	1191	0.05	101	C	55	644309	5966964	4	1	0	0.2	8	0	0	0	0	1	0	0.5

APPENDIX C

BAM VEGETATION INTEGRITY PLOT DATA

APPENDIX D

BAM-C PREDICTED SPECIES REPORT

APPENDIX E

BAM-C CANDIDATE SPECIES REPORT

APPENDIX F

BIODIVERSITY CREDIT REPORT

APPENDIX G

PROTECTED MATTERS SEARCH TOOL RESULTS

APPENDIX H

ASSESSMENTS OF SIGNIFICANCE FOR EPBC ACT LISTED SPECIES

H1 *CALOTIS GLANDULOSA* (MAUVE BURR-DAISY)

Calotis glandulosa (Mauve Burr-daisy) is listed as Vulnerable under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Calotis glandulosa was not recorded on the subject land during survey, however, in the absence of a targeted survey in the correct season, presence is assumed in areas of potentially suitable habitat. The proposed development has the potential to remove 0.80 ha of potential habitat for *Calotis glandulosa* in the form of PCT 1191 (includes Moderate condition vegetation with some small areas of Poor condition vegetation).

IS AN IMPORTANT POPULATION LIKELY TO BE PRESENT?

Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

No important populations are listed for the species within the locality (Office of Environment and Heritage 2018, Department of Agriculture Water and the Environment 2021). Several records for the species have been made within the locality so it is possible that the species occurs on the subject land within the soil seedbank, however, given that no records have been made within the immediate vicinity, the subject land is unlikely to contain an important population of this species.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A VULNERABLE SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES

Not applicable. No important populations of this species have been identified in the subject land.

REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION

Not applicable. No important populations of this species have been identified in the subject land.

FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS

Not applicable. No important populations of this species have been identified in the subject land.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

No critical habitat is currently listed for this species (Department of Agriculture Water and the Environment 2021)

Habitat critical to the survival of a species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The subject land does not occur at the limit of the species range as known habitat occurs in the area and multiple records exist within the locality. As no records or significant populations occur within the immediate vicinity of the subject land it is not likely represent critical habitat in terms of species dispersal, genetic diversity or long-term maintenance.

DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION

Not applicable. No important populations of this species have been identified in the subject land.

MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 0.80 ha of vegetation of PCT 1191 representing potential habitat for *Calotis glandulosa*. This is a small component of locally available habitat for the species. Though the loss of this habitat represents an incremental loss of potential habitat for the species, the habitat is not considered to be critical and is unlikely to destroy, remove, isolate or decrease habitat to the extent that the species is likely to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

The Proposal involves construction works that have potential to introduce disease or pathogens into the site and surrounding areas. This would be controlled through the implementation of appropriate mitigation measures, making the risk unlikely.

INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES.

There is currently no adopted or made recovery plan for this species. The approved conservation advice for the species (Department of the Environment Water Heritage and the Arts 2008) identifies a number of regional and local priority actions for the species to assist in recovery. The proposed development is unlikely to substantially interfere with any of these actions

CONCLUSION

The proposed development has the potential to remove 0.80 ha of vegetation representing potential habitat for *Calotis glandulosa***.** Though the species has the potential to occur within the subject land and this removal will represent an incremental loss of potential habitat for the species, the area to be removed represents a small proportion of locally available habitat for the species and is unlikely to be critical to the species' long-term survival. Therefore, the proposed development is unlikely to significantly impact the species.

H2 *LEUCOCHRYSUM ALBICANS* VAR. *TRICOLOR* (HOARY SUNRAY)

Leucochrysum albicans var. *tricolor* (Hoary Sunray) is listed as Endangered under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Leucochrysum albicans var. *tricolor* was not recorded on the subject land during survey, however, in the absence of a targeted survey in the correct season, presence is assumed in areas of potentially suitable habitat. The proposed development has the potential to remove 0.80 ha of potential habitat for *Leucochrysum albicans* var. *tricolor* in the form of PCT 1191 (includes Moderate condition vegetation with some small areas of Poor condition vegetation).

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A CRITICALLY ENDANGERED OR ENDANGERED SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION

The proposed development has the potential to remove 0.80 ha of potential habitat for this species. *Leucochrysum albicans* var. *tricolor* is known to occur within the South Eastern Highlands bioregion, along the Snowy River and has a number of records within the locality. The species is known to occur in a broad variety of grassland, woodland and forest habitats, including some modified habitats in NSW. The habitat within the subject land therefore represents a small component of locally and regionally available habitat for the species. Although the species has the potential to occur within the subject land, the broad-ranging distribution and habitat for the species within the area means the proposal is unlikely to significantly impact a population, leading to long-term decrease, if the species is found to occur.

REDUCE THE AREA OF OCCUPANCY OF THE SPECIES

The species has not previously been recorded within the subject land. Given that the species has not been surveyed in the appropriate season, it is possible that the species occurs on the subject land and that the total area of occupancy for the species may be reduced. However, as the species has a relatively broad distribution in the region and the amount of vegetation to be removed by the proposed development represents a small component of locally available habitat for the species, the potential reduction of occupied area is unlikely to be significant.

FRAGMENT AN EXISTING POPULATION INTO TWO OR MORE POPULATIONS

The species has not previously been recorded within the subject land and no populations are currently known to occur. Given the small area of habitat to be removed, and lack of records of the species within the immediate vicinity of the subject land, the proposed development is unlikely to result in significant fragmentation of a population.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

No habitat critical to the survival of the species is currently listed (Sinclair 2010).

Habitat critical to the survival of a species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The habitat within the subject land represents a small component of locally available habitat for the species and multiple records exist within the locality and broader region. As such, the habitat within the subject land is unlikely to be significant in terms of species dispersal, genetic diversity, reintroduction, recovery or long-term maintenance.

DISRUPT THE BREEDING CYCLE OF A POPULATION

The Hoary Sunray is an obligate out-breeder that is entirely dependent on the transfer of pollen between individuals for successful reproduction. The species has many different insect pollinators including bees and flies. Seed is thought to be able to disperse over many kilometres and will germinate fairly rapidly under a wide range of conditions, remaining viable in the soil for at least a few months (although probably not for long periods) (Sinclair 2010). If seed is present within the soil, the proposed development has the potential to minorly disrupt the breeding cycle of the species. However, given the wide range of pollinators and potential dispersal abilities of the species, the impact to the breeding cycle on the subject land is unlikely to be significant.

MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 0.80 ha of vegetation of PCT 1191 representing potential habitat for *Leucochrysum albicans* var. *tricolor*. This is a small component of locally available habitat for the species. Though the loss of this habitat represents an incremental loss of potential habitat for the species, the proposed development is unlikely to destroy, remove, isolate or decrease habitat to the extent that the species is likely to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A CRITICALLY ENDANGERED OR ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

The Proposal involves construction works that have potential to introduce disease or pathogens into the site and surrounding areas. This would be controlled through the implementation of appropriate mitigation measures, making the risk unlikely.

INTERFERE WITH THE RECOVERY OF THE SPECIES.

A national recovery plan for this species has been developed (Sinclair 2010). This plan has the following specific objectives:

1. Determine distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that key populations and their habitat are protected, monitored and managed
4. appropriately
5. Manage threats to populations
6. Identify key biological characteristics
7. Determine growth rates and viability of populations
8. Build community support for conservation

The proposed development is unlikely to interfere with any of the recovery objectives outlined.

CONCLUSION

The proposed development has the potential to remove 0.80 ha of vegetation representing potential habitat for *Leucochrysum albicans* var. *tricolor*. Though the species has the potential to occur within the subject land and this removal will represent an incremental loss of potential habitat for the species, the area to be removed represents a small proportion of locally available habitat for the species and is unlikely to be critical to the species' long-term survival. Therefore, the proposed development is unlikely to significantly impact the species.

H3 *PRASOPHYLLUM PETILUM* (TARENGO LEEK ORCHID)

Prasophyllum petilum (Tarengo Leek Orchid) is listed as Endangered under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Prasophyllum petilum was not recorded on the subject land during survey, however, in the absence of a targeted survey in the correct season, presence is assumed in areas of potentially suitable habitat. The proposed development has the potential to remove 0.80 ha of potential habitat for *Prasophyllum petilum* in the form of PCT 1191 (includes Moderate condition vegetation with some small areas of Poor condition vegetation).

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A CRITICALLY ENDANGERED OR ENDANGERED SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION

The proposed development has the potential to remove 0.80 ha of potential habitat for this species. The species has not previously been recorded within the locality, with the closest known population at Delegate (> 100 km away), though has the possibility to occur on the subject land due to the availability of potential habitat and the cryptic nature of the species. Given that the species has not previously been recorded on the site or within the region, it is unlikely that the removal of potential habitat would lead to a long-term decrease in the population.

REDUCE THE AREA OF OCCUPANCY OF THE SPECIES

The total area of occupancy of this species is currently estimated to be around 4.5 ha, across five known populations (Department of Agriculture Water and the Environment 2021). Due to the highly restricted area of occupancy, the removal of any additional plants would be likely to significantly reduce the total occupied area. However, the species is not currently known to occur in the locality, and given the total availability of additional, higher-quality habitat within the broader region, the removal of this small amount of potential habitat is unlikely to significantly reduce the potential occupied area available to the species.

FRAGMENT AN EXISTING POPULATION INTO TWO OR MORE POPULATIONS

The species has not previously been recorded within the subject land and no populations are currently known to occur. Given the small area of habitat to be removed, and lack of records of the species within the immediate vicinity of the subject land, the proposed development is unlikely to result in significant fragmentation of a population.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

This species currently has a very restricted distribution with low population size at most occupied sites. Given this, all remaining occupied habitat is critical to the survival of the species (Department of Environment Climate Change and Water (NSW) 2010). This species is recommended for survey during the appropriate survey season, and if individuals are recorded in the subject land, the habitat to be removed would therefore represent habitat critical for survival. However, if no individuals are recorded, the habitat is unlikely to be critical given the additional availability of the habitat within the wider region, and lack of records of the species in the region.

DISRUPT THE BREEDING CYCLE OF A POPULATION

Prasophyllum species are generally pollinated by bees, wasps and other insects and *Prasophyllum petilum* is known to be pollinated by a generalist thynnine wasp. *Prasophyllum* species reproduce mostly from seed, although it is likely that limited clonal reproduction also occurs in *Prasophyllum petilum*. *Prasophyllum* seeds are very small and light, so theoretically could spread over wide distances. In practice, however, they probably generally only disperse over several metres. Successful germination of *Prasophyllum* species requires the presence of a fungal symbiont (Department of Environment Climate Change and Water (NSW) 2010).

The proposed development is unlikely to significantly affect any component of the breeding cycle of this species, such as by reducing the presence of pollinators. However, if the species is found to occur following additional survey, the proposed development would be likely to significantly impact the species ability to disperse and germinate within the locality.

MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 0.80 ha of vegetation of PCT 1191 representing potential habitat for *Prasophyllum petilum*. This is a small component of locally available habitat for the species. Though the loss of this habitat represents an incremental loss of potential habitat for the species, the proposed development is unlikely to destroy, remove, isolate or decrease habitat to the extent that the species is likely to decline if it occurs in the region. If, however, a population is found in the development area following additional survey, the impact is likely to be significant.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A CRITICALLY ENDANGERED OR ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

The Proposal involves construction works that have potential to introduce disease or pathogens into the site and surrounding areas. This would be controlled through the implementation of appropriate mitigation measures, making the risk unlikely.

INTERFERE WITH THE RECOVERY OF THE SPECIES.

A national recovery plan for this species has been developed (Department of Environment Climate Change and Water (NSW) 2010). This plan has the following proposed recovery actions:

1. Monitor populations
2. Monitor the encroachment of native species that may adversely affect *P. petilum* at Tarengo TSR, Hall Cemetery and Captains Flat, and control if required.
3. Weed control
4. Conduct further survey
5. Develop and implement management plans for populations
6. Analyse the data from the burning/grazing trials at Tarengo
7. Conduct the burning and grazing trials again
8. The development of extensions to Hall cemetery be expedited.
9. Co-ordinate recovery actions

The proposed development is unlikely to interfere with any of the recovery actions outlined.

CONCLUSION

The proposed development has the potential to remove 0.80 ha of vegetation representing potential habitat for *Prasophyllum petilum*. This species has not previously been recorded in the locality and is not known to occur in the region, however it has been considered for this assessment due to the cryptic nature of the species and availability of appropriate habitat. The species has been recommended for future surveys in the appropriate survey season. If the species is recorded in future surveys, the potential impact of the development is likely to be significant, due to the highly restricted distribution and small population size of the species. However, if individuals are not recorded, the species is considered unlikely to be significantly impacted. Though the species has the potential to occur within the subject land and this removal will represent an incremental loss of potential habitat for the species, the area to be removed represents a small proportion of regionally available habitat for the species and is unlikely to be critical to the species' long-term survival.

H4 *THESIUM AUSTRALE* (AUSTRAL TOADFLAX)

Thesium australe (Austral Toadflax) is listed as Vulnerable under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Thesium australe was not recorded on the subject land during survey, however, in the absence of a targeted survey in the correct season, presence is assumed in areas of potentially suitable habitat. The proposed development has the potential to remove 5.98 ha of potential habitat including 2.29 ha in PCT 1191.

IS AN IMPORTANT POPULATION LIKELY TO BE PRESENT?

Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

No important populations are currently listed for this species (Department of Agriculture Water and the Environment 2021). The species does not have any records within the locality; however, is known to occur within the broader region and the species is cryptic in nature and has the potential to occur on the subject land due to the availability of potential habitat. Given the current distribution of the species is sporadic but widespread across the wider region, it is unlikely that any individuals identified during survey would be part of an important population, particularly given the relatively small amount of potential habitat to be impacted in regard to additional habitat available in the region.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A VULNERABLE SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES

Not applicable. No important populations of this species have been identified in the subject land.

REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION

Not applicable. No important populations of this species have been identified in the subject land.

FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS

Not applicable. No important populations of this species have been identified in the subject land.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

No habitat critical to the survival of the species is currently listed.

Habitat critical to the survival of a species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The habitat within the subject land represents a small component of locally available habitat for the species and the species is sporadically but widely distributed throughout habitat in the broader region. As such, the habitat within the

subject land is unlikely to be significant in terms of species dispersal, genetic diversity, reintroduction, recovery or long-term maintenance.

DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION

Not applicable. No important populations of this species have been identified in the subject land.

MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 5.98 ha of vegetation of PCT 1191 representing potential habitat for *Thesium australe*. This is a small component of locally available habitat for the species. Though the loss of this habitat represents an incremental loss of potential habitat for the species, the proposed development is unlikely to destroy, remove, isolate or decrease habitat to the extent that the species is likely to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

The Proposal involves construction works that have potential to introduce disease or pathogens into the site and surrounding areas. This would be controlled through the implementation of appropriate mitigation measures, making the risk unlikely.

INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES.

There is currently no adopted or made recovery plan for this species. The approved conservation advice for the species (Environment 2013) identifies a number of regional and local priority actions for the species to assist in recovery. The proposed development is unlikely to substantially interfere with any of these actions.

CONCLUSION

The proposed development has the potential to remove 5.98 ha of vegetation of PCT 1191 representing potential habitat for *Thesium australe*. Though the species has the potential to occur within the subject land and this removal will represent an incremental loss of potential habitat for the species, the area to be removed represents a small proportion of locally available habitat for the species and is unlikely to be critical to the species' long-term survival. Therefore, the proposed development is unlikely to significantly impact the species.

H5 REGENT HONEYEATER

Regent Honeyeater (*Anthochaera phrygia*) is listed as Critically Endangered under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Regent Honeyeater was not recorded on the subject land during survey; however, the species has a broad distribution throughout the state and potentially suitable habitat for the species was present in the subject. The proposed development has the potential to impact up to 4.98 ha of vegetation of PCT 1191 representing potential foraging habitat for the Regent Honeyeater.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A CRITICALLY ENDANGERED OR ENDANGERED SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION

Approximately 4.98 ha of potential foraging habitat for the Regent Honeyeater would be affected by the proposed development. While habitat in the development footprint has the potential to be used by the species, it is not likely to be of high importance due to its relatively small area and the availability of greater quality habitat within the locality and wider region. Similarly, no known breeding areas occur nearby and there is a general paucity of records for the species within the broader region, with the closest NSW record > 100 km away in Kosciuszko National Park. Regent Honeyeaters are highly mobile in nature, occurring only irregularly in most sites partially due to irregular distribution of blossom resources used for foraging (Department of the Environment 2016, Department of Agriculture Water and the Environment 2021), so the species has the potential to use the foraging habitat within the subject land on occasion. However, any identified population of Regent Honeyeater in the project locality would not be restricted to habitat within the subject land and due to the species' large home range and nomadic nature, similar foraging habitat can be accessed within the locality. Consequently, the proposed development is not considered likely to significantly contribute to a long-term decline in the size of a population of these species.

REDUCE THE AREA OF OCCUPANCY OF THE SPECIES

The proposed development is likely to affect approximately 4.98 ha of potential foraging habitat for this species. Although the proposed action will result in the loss of potential foraging habitat, the incremental loss of a small area of potential habitat, only represents a small component of similar locally occurring resources accessible for this species. Due to the nomadic nature of the species and the availability of additional higher quality habitat within the broader region, the proposed development is unlikely to significantly the area of occupancy of the species at this stage. Nevertheless, the removal of approximately 4.98 ha of potential habitat is considered to be a small incremental loss of suitable habitat locally and as such has the potential to incrementally reduce the area of occupancy for the Regent Honeyeater during seasons when individuals of this species may be reliant on local resources.

FRAGMENT AN EXISTING POPULATION INTO TWO OR MORE POPULATIONS

Habitat connectivity is not likely to be affected by the proposed work, given that this species is highly mobile and nomadic, and the development would not present a significant barrier to this species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the subject land.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

According to the national recovery plan for the species (Department of the Environment 2016), habitat critical to the survival of the regent honeyeater includes:

- any breeding or foraging areas where the species is likely to occur
- any newly discovered breeding or foraging locations.

As the subject land does not contain any breeding habitat and the species is not restricted to or reliant on habitat therein for foraging, it is unlikely that the proposed development will adversely affect habitat critical to the survival of this species.

DISRUPT THE BREEDING CYCLE OF A POPULATION

Within the Regent Honeyeaters current distribution there are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. None of these known breeding areas occur within or near the subject land. Furthermore, this species is highly mobile and is known to disperse widely. The 4.98 ha potential foraging habitat likely to be affected is representative of larger patches of locally occurring resources that would be accessible to this species. Therefore, the removal of about 4.98 ha of potential foraging habitat is unlikely to disrupt the breeding cycle of a population of Regent Honeyeater.

MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 4.98 ha of native vegetation of PCT 1191 considered to be potential foraging habitat for this species. The removal of approximately 4.98 ha of potential habitat is considered to be an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, this species has the potential to forage in higher quality habitat within greater locality and region. Considering the mobile nature of this species, this action is unlikely to isolate the species habitat significantly. Similarly given the relatively small amount of potential habitat to be removed, is unlikely that the proposed development would modify, destroy or remove habitat for this species to the extent that is likely to cause the species to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A CRITICALLY ENDANGERED OR ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

The Proposal involves construction works that have potential to introduce disease or pathogens into the site and surrounding areas. This would be controlled through the implementation of appropriate mitigation measures, making the risk unlikely.

INTERFERE WITH THE RECOVERY OF THE SPECIES.

A national recovery plan for this species has been developed (Department of the Environment 2016). This plan has the following broad recovery objectives:

- to reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to
- enhance the condition of habitat across the regent honeyeaters range to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

The proposed development is unlikely to significantly interfere with any of the recovery objectives outlined

CONCLUSION

The proposed development has the potential to remove 4.98 ha of native vegetation of PCT 1191 considered to be potential foraging habitat for Regent Honeyeater. The extent of native vegetation clearing, and foraging habitat removal associated with the proposed development is considered to be small in terms of available habitat for the species within region and there is a general paucity of records for the species within the region, with the closest record >100 km away. The irregular distribution of blossom resources, which is a key driver of nomadism of this species, may cause this species to occasionally forage within the subject land. Although it is considered unlikely that the loss of potential foraging habitat will cause the local extinction of the Regent Honeyeater, the vegetation to be removed could be utilised by this species intermittently during periods of seasonal blossom variation. The proposed development is not considered to fragment any locally occurring populations, affect habitat critical to their survival, disrupt their breeding cycles, or interfere with the recovery of these species. Consequently, though the removal of potential foraging habitat for the proposed development is considered to represent an incremental loss of available local habitat, it is not considered likely to have a significantly impact the long-term viability of the species.

H6 SPOTTED-TAIL QUOLL

Spotted-tail Quoll (*Dasyurus maculatus*) is listed as Endangered under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

This species was not recorded on the subject land during survey, and there are no historic records within the locality of this species, however spotted-tail quolls are highly mobile with large home-ranges and is possible that a population of the Spotted-tailed Quoll may periodically within the subject land as part of a larger home range, when seeking prey. The habitat to be removed is degraded in quality and is unlikely to represent significant foraging or breeding resources for this species but occasional occurrences through the area cannot be discounted.

The proposed development will remove up to 4.98 ha of native vegetation of PCT 1191, representing potential habitat for this species.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A CRITICALLY ENDANGERED OR ENDANGERED SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION

There have been no historic records of this species in the locality, but due to the wide-ranging nature of the species potential occurrences cannot be discounted. If a population of the Spotted-tailed Quoll is present in the locality, individuals from this population may potentially occur periodically within the subject land as part of a larger home range, when seeking prey.

Due to the degraded quality of the habitat within the subject land, and given their large home ranges and mobile nature, a population of Spotted-tailed Quoll is unlikely to permanently reside in the subject land. Therefore, it is unlikely that the proposed development would lead to a long-term decrease of a population of the Spotted-tailed Quoll within the meaning of this criterion, as a population is unlikely to currently occur and persist in the subject land.

REDUCE THE AREA OF OCCUPANCY OF THE SPECIES

Spotted-tailed Quoll has not been recorded within the subject land and there are no historic records within the locality.

The proposed development would add incrementally to the overall reduction of potential habitat for the species (if present), though the vegetation to be removed is a relatively small component of additional habitat available within the wider locality. Given their large home ranges and mobile nature, a population of Spotted-tailed Quoll is unlikely to permanently reside in the subject land, or to be dependent on the subject land for foraging. The proposed development is unlikely to reduce the area of occupancy of the Spotted-tailed Quoll (if present).

FRAGMENT AN EXISTING POPULATION INTO TWO OR MORE POPULATIONS

The documented home range for the Spotted-tailed Quoll is relatively large with a home range of 992 ± 276 ha for males, and 244 ± 72 ha for females (Department of Agriculture Water and the Environment 2021). The potential habitat within development site and broader locality is currently modified and exposed to existing fragmentation, thereby limiting the potential for any substantial additional fragmentation to occur. Given the ability of this species to disperse over cleared areas, is it considered unlikely that the action would fragment an existing population into two or more populations.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

The national recovery plan for the species (Department of Land Water and Planning 2016) stipulates that habitat critical to the survival of the Spotted-tailed Quoll occurs as large patches of forest with adequate denning / breeding resources and relatively high densities of medium-sized mammalian prey (Department of Land Water and Planning 2016). The subject land does not fit this description due to the limited amount of foraging and denning resources available. Additionally, the subject is much smaller than the documented home range for the species, and typically, such home ranges would only be supported by large contiguous patches of habitat. The subject land is unlikely to be large enough for species dispersal and is not considered likely to be important for long-term maintenance of the species, genetic diversity or species introduction. Consequently, the subject land does not provide habitat critical to the survival of the species.

DISRUPT THE BREEDING CYCLE OF A POPULATION

The vegetation within the study area does not support significant denning or breeding resources for this species and is unlikely to be of sufficient quality to support resident individuals. Therefore, the subject land is unlikely to impact the breeding cycle of a local population (if present), as the species is highly unlikely to breed within the subject land.

MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The proposed development has the potential to remove 4.98 ha of native vegetation of PCT 1191 considered to be potential habitat for this species. The removal of approximately 4.98 ha of potential habitat is considered to be an incremental loss, decreasing the amount of suitable foraging habitat available locally. However, considering the mobile nature of this species, and broad home range, as well as availability of additional high quality habitat in the broader region, this action is unlikely to isolate the species habitat significantly. Similarly given the relatively small amount of potential habitat to be removed, is unlikely that the proposed development would modify, destroy or remove habitat for this species to the extent that is likely to cause the species to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A CRITICALLY ENDANGERED OR ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

Not applicable, as there are no known diseases that are harmful to the Spotted-tailed Quoll.

INTERFERE WITH THE RECOVERY OF THE SPECIES.

The national recovery plan for the species (Department of Land Water and Planning 2016) identifies 11 specific objectives to guide the recovery of the Spotted-tailed Quoll, including:

1. determine the distribution and status of Spotted-tailed Quoll populations throughout the range and identify key threats and implement threat abatement management practices
2. investigate key aspects of the biology and ecology of the Spotted-tailed Quoll to acquire targeted information to aid recovery
3. reduce the rate of habitat loss and fragmentation on private land
4. evaluate and manage the risk posed by silvicultural practices

5 determine and manage the threat posed by introduced predators (foxes, cats, wild dogs) and of predator control practices on Spotted-tailed Quoll populations
6 determine and manage the impact of fire regimes on Spotted-tailed Quoll populations
7 reduce deliberate killings of Spotted-tailed Quolls
8 reduce the frequency of Spotted-tailed Quoll road mortality
9 assess the threat Cane Toads pose to Spotted-tailed Quolls and develop threat abatement actions if necessary
10 determine the likely impact of climate change on Spotted-tailed Quoll populations
11 increase community awareness of the Spotted-tailed Quoll and involvement in the Recovery Program.

The proposed development has the potential to impact on objective 3 of the recovery plan.

CONCLUSION

While the proposed development would add incrementally to the loss of Spotted-tailed Quoll habitat at the local scale, it is not likely to further fragment or isolate habitat or be detrimental to the long-term persistence of a local population of the species (if present). In addition, the potentially affected habitat is unlikely to be important for the conservation of the local Spotted-tailed Quoll population over the long-term. In summary, the proposed development is unlikely to have a significant impact on the Spotted-tailed Quoll.

H7 KOALA

Koala (*Phascolarctos cinereus*) is listed as Vulnerable under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

This species was not recorded during survey, and rapid targeted scat surveys failed to detect potential occurrences. However, potential foraging habitat is present in the subject land due to the presence of secondary feed tree species *Eucalyptus rubida* and *Eucalyptus pauciflora* in PCT 1191. Consequently, rare occurrences of dispersing animals cannot be entirely discounted. The proposed development has the potential to remove 4.98 ha of native vegetation of PCT 1191 containing potential foraging resources for this species.

IS AN IMPORTANT POPULATION LIKELY TO BE PRESENT?

Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

No important populations are currently listed for this species (Department of Agriculture Water and the Environment 2021). No individuals were recorded in the subject land and no records post 1950 occur within the locality. There is no approved Koala Plan of Management (KPoM) for the local government area, and no core koala habitat, or 'highly suitable habitat' was detected on the subject land. Vegetation in the subject land contains secondary feed tree species only, and the subject land may be used on an intermittent basis during local movements, but it is not likely to represent important habitat. Although the site does provide secondary feed tree species and marginal potential foraging habitat, similar and more preferable habitat occurs more widely within the region.

This species, if occurring within the Modification study area, would not be at the limit of its known range; nor would the population there be likely to be a key source population or necessary for maintaining genetic diversity. Therefore, it is considered that a population of these species, if present, is unlikely to be an 'important population'.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A VULNERABLE SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES

Not applicable as an 'important population' is unlikely to exist in the subject land (see above).

REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION

Not applicable as an 'important population' is unlikely to exist in the subject land (see above).

FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS

Not applicable as an 'important population' is unlikely to exist in the subject land (see above).

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

No critical habitat is currently listed for this species (Department of Agriculture Water and the Environment 2021). Habitat critical to the survival of a species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The habitat within the subject land represents a small component of locally available habitat for the species and the species is sporadically but widely distributed throughout habitat in the broader region. As such, the habitat within the subject land is unlikely to be significant in terms of species dispersal, genetic diversity, reintroduction, recovery or long-term maintenance. Although the site does provide marginal potential foraging habitat in the form of secondary feed tree species, similar and more preferable habitat occurs more widely within the region. The subject land may be used on an intermittent basis during local movements but is unlikely to be significant in terms of species dispersal, genetic diversity, reintroduction, recovery or long-term maintenance. The proposed development is therefore unlikely affect habitat of critical importance to these species.

DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION

Not applicable as an 'important population' is unlikely to exist in the subject land (see above).

MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The lack of recent records within the locality and lack of highly suitable habitat within the subject land mean the area is likely to be used only on an occasional basis, if at all. Although the site does provide secondary feed tree species and marginal potential foraging habitat, similar and more preferable habitat occurs more widely within the region. The subject land may be used on an intermittent basis during local movements, but it is not likely to represent important habitat for this species. Considering the mobile nature of the species, the existing fragmentation within the subject land and the fact that similar and higher quality habitat exists within the region, the proposed development is unlikely to fragment, remove or modify the habitat in a way that will cause this species to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

It is considered unlikely that the subject land would significantly fragment a koala population to the point where dispersal is limited and therefore disease transmission between individuals is increased. As *Chlamydia* bacteria in Koalas and Koala Retrovirus is primarily transmitted between Koala individuals (Department of Environment & Climate Change 2008), it is unlikely that the proposed development would introduce disease that may cause the species to decline.

INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES.

There is currently no adopted or made recovery plan for this species. The approved conservation advice for the species (Department of Sustainability Environment Water Population and Communities 2012) identifies a number of priority actions for the species across NSW, the ACT and Queensland to assist in recovery. The proposed development is unlikely to substantially interfere with any of these actions.

CONCLUSION

Vegetation in the subject land contains secondary feed tree species only (*Eucalyptus rubida* and *Eucalyptus pauciflora*), and koalas are not currently known to occur within the locality. There is a possibility of rare occurrences of dispersing animals in the subject land.

While the proposed development would remove up to 4.98 ha of native vegetation of PCT 1191 containing potential foraging resources, no important koala habitat occurs within the subject land and it is considered that the proposed development would not reduce the area of occupancy of this species given the better quality habitat in the locality and greater region.

The proposed development is unlikely to represent significant increases to habitat isolation and or fragmentation. Considering the mobility of the species, the proposed development would not impact the long-term survival of populations in the locality (if they exist) and is unlikely to further create a movement barrier for these species. Due to the relatively small area of impact, the low likelihood of occurrence and the lack of preferred feed trees, the proposed development is considered unlikely to have a significant impact on the species.

H8 WHITE-THROATED NEEDLETAIL

White-throated Needletail (*Hirundapus caudacutus*) is listed as Vulnerable and Migratory under the EPBC Act.

The following assessment has been undertaken following the Matters of National Environmental Significance (MNES), Significant Impact Guidelines 1.1 (Department of the Environment 2013).

SPECIFIC IMPACTS

Though this species was not recorded in the subject land during survey, it has previously been recorded in aerial space within the locality and broader region. The subject land only provides aerial foraging habitat for this species. The proposed development will result in the removal of approximately 4.98 ha of potential habitat for the species that is likely utilised for foraging as part of a far larger home range.

IS AN IMPORTANT POPULATION LIKELY TO BE PRESENT?

Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

The White-throated Needletail a migratory species and occurs in Australia only between late spring and early autumn but mostly in summer. This species are non-breeding migrants with breeding taking place in Northern Asia. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. They catch the insects in flight in their wide gaping beaks. In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats. The species occurs over most types of habitat, though they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps (Department of Planning Industry and Environment 2021).

The subject land does not contain key resources for breeding or dispersal and is unlikely to be necessary for maintaining genetic diversity. The subject land also does not occur at the limit of the species distribution range (as it occurs over eastern and northern Australia and in Northern Asia) (Department of Planning Industry and Environment 2021). Consequently, potential individuals that may occur are not considered to form part of an 'important population'.

UNDER THE EPBC ACT, AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A VULNERABLE SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:

LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES

Not applicable. White-throated Needletail occurring in the Modification study area is not part of an important population.

REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION

Not applicable. White-throated Needletail occurring in the Modification study area is not part of an important population.

FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS

Not applicable. White-throated Needletail occurring in the Modification study area is not part of an important population.

ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES

No critical habitat is currently listed for this species (Department of Planning Industry and Environment 2021). Habitat critical to the survival of a species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The proposed development will remove a small area (4.98 ha) of potential aerial foraging habitat for this species. The White-throated Needletail is a migratory species and breeds in northern Asia. This species forages on the wing and the vegetation within the subject land is likely to provide aerial foraging habitat for this species. This species occurs widely along the coast of NSW and QLD whilst in Australia suitable foraging resources could be accessed widely throughout the locality and beyond. Therefore, this would not meet the above criteria and the subject land is not critical to the survival of the White-throated Needletail.

DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION

Not applicable. White-throated Needletail occurring in the subject land is not part of an important population.

MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE

The habitat to be removed is likely to be utilised by the species on an occasional basis for aerial foraging. Additional habitat will remain broadly within the locality and wider region. Consequently, it is unlikely that the proposed development would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT

Habitat for the species in the subject land is varied in condition with much of the woodland and agricultural landscape in modified or poor condition, and many patches dominated by exotic ground species. Weed and pest faunal species are both currently present throughout the landscape and it is considered unlikely that the proposal would substantially change the composition of the species habitat within the landscape or increase the spread and establishment of invasive species (i.e. predators) that could threaten the survival of the species. There is potential for the project works to introduce additional weeds and pathogens within the project site and surrounding locality – mitigation measures outlined in the would be put in place for the proposed works to address this and any other potential pest introduction.

INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE, OR

No. There are no known diseases that are likely to increase in the area as a result of the proposed development.

INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES.

There is currently no adopted or made recovery plan for this species. The approved conservation advice for the species (Threatened Species Scientific Committee 2019) identifies the following primary conservations actions:

- work with governments in East Asia to minimise destruction of key breeding habitats
- important habitats in Australia are identified and protected.

across NSW, the ACT and Queensland to assist in recovery. The proposed development is unlikely to substantially interfere with any of these actions.

The proposed development is unlikely to substantially interfere with either of these actions.

CONCLUSION

The subject land only provides aerial foraging habitat with no breeding occurring within Australia. The White-throated Needletail is likely to use the subject land for aerial foraging on an intermittent basis and the proposed development is not likely to have a significant impact upon available resources for this species in the vicinity of the subject land or its wider locality. Therefore, the habitat to be impacted would not be considered to significantly impact the long-term survival of the White-throated Needletail.

H9 LISTED MIGRATORY SPECIES

Eleven EPBC Act listed Migratory species, or suitable habitat were identified as either known to occur within the search area, likely to occur within the search area, or may occur within the search area. These 11 species include migratory marine birds (one species), migratory terrestrial species (four species), and migratory wetlands species (six species). Of these listed migratory species, the following three species outlined in Table H.1 are considered moderately likely to occur in, or fly over, the subject lands based on the presence of suitable habitats. These three species are considered for further assessment.

Table H.1 EPBC Act listed migratory species that are considered moderately or highly likely to occur within the subject lands

COMMON NAME	SPECIES NAME	EPBC ACT MIGRATORY STATUS	ASSESSMENT
Migratory Marine Birds			
Fork-tailed Swift	*Apus pacificus*	Migratory	Moderately likely to occur. Included for assessment.
Migratory Terrestrial Species			
White-throated Needletail	*Hirundapus caudacutus*	Migratory	Moderately likely to occur. Included for assessment.
Satin Flycatcher	*Myiagra cyanoleuca*	Migratory	Highly likely to occur. Breeding known to occur within PMST search area. Included for assessment.

H9.1 IS THE HABITAT TO BE IMPACTED IMPORTANT?

Important habitat for EPBC Act listed Migratory species is defined as (Department of Environment, 2013):

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat that is of critical importance to the species at particular life-cycle stages
- habitat utilised by a migratory species which is at the limit of the species range
- habitat within an area where the species is declining.

While some migratory species of bird are likely to use the proposal study area and locality, it would not be classed as an 'important habitat' for the following reasons:

- There are no important habitats for the Fork-tailed Swift, White-throated Needletail or Satin Flycatcher in the subject land as outlined in the *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015d).
- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the proposal study area.
- The proposal area does not contain any known important foraging grounds for listed Migratory species and the proposal would not impact on any significant foraging habitats.
- The proposal area does not contain any known important staging grounds for migration.
- The proposal area does not contain habitat that is at the limit of a listed Migratory species' range.
- The proposal area is not located within an area where a listed Migratory species is known to be declining.

H9.2 SIGNIFICANT IMPACT CRITERIA

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

SUBSTANTIALLY MODIFY (INCLUDING BY FRAGMENTING, ALTERING FIRE REGIMES, ALTERING NUTRIENT CYCLES OR ALTERING HYDROLOGICAL CYCLES), DESTROY OR ISOLATE AN AREA OF IMPORTANT HABITAT FOR A MIGRATORY SPECIES

While some migratory species of bird are likely to use the proposal study area and locality, it would not be classed as an 'important habitat' for the following reasons:

- There are no important habitats for the Fork-tailed Swift, White-throated Needletail or Satin Flycatcher in the subject land as outlined in the *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015d).
- A nationally significant proportion of a listed Migratory bird population would not be supported by the habitats in the proposal study area.
- The proposal area does not contain any known important foraging grounds for listed Migratory species and the proposal would not impact on any significant foraging habitats.
- The proposal area does not contain any known important staging grounds for migration.
- The proposal area does not contain habitat that is at the limit of a listed Migratory species' range.
- The proposal area is not located within an area where a listed Migratory species is known to be declining.

RESULT IN AN INVASIVE SPECIES THAT IS HARMFUL TO THE MIGRATORY SPECIES BECOMING ESTABLISHED IN AN AREA OF IMPORTANT HABITAT FOR THE MIGRATORY SPECIES, OR

The habitat within the proposal area would not be considered important habitat for a listed Migratory species. Nevertheless, the planned mitigation measures would prevent any invasive species becoming established.

SERIOUSLY DISRUPT THE LIFECYCLE (BREEDING, FEEDING, MIGRATION OR RESTING BEHAVIOUR) OF AN ECOLOGICALLY SIGNIFICANT PROPORTION OF THE POPULATION OF A MIGRATORY SPECIES.

An ecologically significant proportion of a listed Migratory species population would not occur in the proposal study area. The *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015d) defines an ecologically significant proportion of the population of the Fork-Tailed Swift and White-throated Needletail as described in Table H.1. For species such as the Fork-Tailed Swift, Satin Flycatcher and White-throated Needletail that aggregate in flocks, 1% of the population is considered internationally important, 0.1% as nationally important and therefor ecologically significant. The proposal would not impact on an internationally or nationally important proportion of the Fork-Tailed Swift, Satin Flycatcher or White-throated Needletail population as the habitat to be impacted does not have the capacity to support this number of birds.

Table H.1 Definitions for an ecologically significant proportion of the population of Fork-Tailed Swift and White-throated Needletail

SPECIES	ECOLOGICALLY SIGNIFICANT PROPORTION OF A POPULATION (NO. INDIVIDUALS)	
	1%	0.1%
White-throated Needletail	100	10
Fork-tailed Swift	1,000	100
Satin Flycatcher	17,000	1,700

CONCLUSION

The proposal would not substantially modify, destroy or isolate an area of important habitat for any EPBC Act listed Migratory species and it would not seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.

APPENDIX I

PROPOSED SITE PLAN

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