



Biodiversity Development Assessment Report

The Robertson Hotel

Report prepared by Narla Environmental

for Con Kotis c/- XPACE Design Group

March 2020



NARLA

environmental

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Prepared for:	Con Kotis c/- XPACE Design Group
Prepared by:	Narla Environmental Pty Ltd
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Executive Summary

Con Kotis c/- XPACE Design Group propose to renovate the heritage hotel, located at 1 Fountaindale Road, Robertson, NSW, 2577 (Lot 2, DP610676). This will involve the construction of a new eastern hotel wing, eight, two-storey eco-cabins, 12 two-storey villas, leisure facilities and an associated network of footpaths and roads. This Biodiversity Development Assessment Report (BDAR) has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposal on biodiversity values within the subject land. This assessment has been completed in accordance with the Biodiversity Assessment Method (BAM) and includes:

- Comprehensive literature review and desktop assessment to describe the historically recorded environmental and landscape features of the subject land and to identify the suite of threatened biota potentially affected by the proposal;
- Site assessment to describe the biodiversity values of the subject land and to determine the likelihood of threatened biota and their habitats occurring within the proposed development footprint;
- Targeted field surveys for a suite of candidate species credit species identified by the Biodiversity Assessment Method Calculator (BAMC) as likely to occur within the native vegetation of the subject land in accordance with the relevant NSW threatened species survey guidelines;
- Discussion and recommendation of measures to avoid and minimise impacts to biodiversity values; and
- Biodiversity Assessment Method calculations using the credit calculator version 1.2.7.2 to quantify the level of biodiversity impacts of the proposal following implementation of measures to avoid and minimise impacts and to determine the biodiversity credits that will need to be purchased and retired to offset the residual impacts of the proposal.

The proposed development is located within a bushland landscape in land zoned *E3-Environmental Management*. The proposal has been purposefully designed to minimise impacts on biodiversity values, including a redesign to avoid high conservation value entities including Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions- Critically Endangered Ecological Community (CEEC) (**Figure 5-1**).

The proposed development is expected to result in impacts to one plant community type (PCT) comprising removal or APZ management of 3.3 hectares (ha) of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion which conforms to the Endangered Ecological Community (EEC) Robertson Rainforest in the Sydney Basin Bioregion.

The proposed development is not expected to impact any threatened biota listed under the Fisheries Management Act 1994 (FM Act).

The biodiversity assessment and credit calculations have been performed in accordance with the BAM (OEH 2017a) and BAMC. The following credits are required to be purchased and retired to offset the biodiversity impacts of the proposal:

- 36 ecosystem credits to offset impacts to 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

Other threatened species identified as potentially being impacted by the proposal are classed as ecosystem credit species which are to be offset through the retirement of the above listed ecosystem credits.

In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified. These include measures to:

- Ensure all contractors employed to work within and around identified biodiversity values within the subject land are suitably qualified and experienced;
- Assign a Project Ecologist to conduct and oversee all ecological compliance requirements associated with conducting a proposed development in line with all relevant state and commonwealth legislation and guidelines;
- Prepare a site-specific Vegetation Management Plan (VMP) that will guide the implementation of all required revegetation efforts in order to minimise and mitigate the potential biodiversity impacts of the proposed activity;
- Have an ecologist present during the clearing of all vegetation both native and exotic related to the proposed development;
- Use native species in all landscape planting within the subject land;
- Protect trees indicated to remain through successful implementation of the Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970);
- Relocate and reinstate threatened fauna habitat features identified within the proposed impact area; and
- Implement all relevant biological hygiene protocols and requirements as per NSW Government guidelines.

During operation there is potential for the proposal to indirectly impact surrounding vegetation and habitat values through:

- Generation of additional light and noise;
- Erosion and sedimentation as a result of runoff from hard stand areas;
- Introduction of weed propagules by vehicle and/or residents/businesses;
- Fauna mortality as a result of collision with vehicles;
- Increased risk of fire; and
- Rubbish dumping.

Mitigation measures are to be implemented to minimise potential operational impacts. These would include:

- Ongoing management of priority weeds according to statutory requirements; and
- Measures to reduce the increased risk of fire.

Considering the nature of the proposal, and the proposed impact mitigation measures proposed, there are unlikely to be any notable indirect impacts on biodiversity values arising from the proposed development. Only the direct impacts of vegetation clearing associated the proposal will require biodiversity offsets as per the BAM.

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate credits from stewardship sites that comply with the trading rules of the NSW Biodiversity Offsets Scheme (BOS) in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

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Glossary

Acronym/ Term	Definition
BAM	The NSW Biodiversity Assessment Method
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	the report produced by the 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.
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 from the impacts of development.
BOS	NSW Biodiversity Offset Scheme.
Biodiversity Values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BioNet	BioNet is made up of a number of data collections. Refer to the links under 'Data collections' for more information. These collections are mostly contained within two core applications; BioNet Atlas and BioNet Vegetation Classification.
BioNet Vegetation Classification	Information about the NSW vegetation communities is maintained in the BioNet Vegetation Classification application. This includes Plant Community Types (PCTs), the master community-level typology used in NSW's planning and assessment tools and vegetation mapping programs.
DA	Development Application
DBH	'diameter at breast height 'the cylindrical diameter of a tree trunk in centimetres sampled at 1.37 metres above the ground
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFA	Flora and Fauna Assessment
ha	Hectare
km	Kilometre
KTP	Key Threatening Process (as listed in the BC Act)

Acronym/ Term	Definition
LGA	Local Government Area
Locality	The area within a 10km radius of the subject land. The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	metres
MNES	Matters of National Environmental Significance
Native Vegetation	means 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.
NPWS	NSW National Parks and Wildlife Services
NSW	The State of New South Wales
OEH	Office of Environment and Heritage
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed.
SAIL	Serious and Irreversible Impacts
SAIL entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAILs)
SEPP	State Environmental Planning Policy
Species Credit	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.
Subject Land	The location of the proposed activity, the subject of this report. The land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Subject Property	1 Fountaindale Road, Robertson, 2577 (Lot 2/DP610676)
Threatened biota	Threatened species, populations or ecological communities listed under the BC Act and/or the EPBC Act.
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1, 1A and 2 and ' <i>threatened species, population or ecological community</i> ' means a species, population or ecological community specified in any of those Schedules.
VMP	Vegetation Management Plan
VIS Plot	Vegetation Integrity Survey Plot

1 Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was engaged by XPACE Design Group on behalf of Con Kotis ('the proponent') to deliver this BDAR to accompany a DA for the redesign of the Robertson Hotel, including the renovation of the heritage hotel, the construction of a new eastern hotel wing, eight two-storey eco-cabins, 12 two-storey villas, leisure facilities and an associated network of footpaths and roads.

This report describes the biodiversity values at the site, with particular emphasis on identification of native PCTs and threatened ecological communities, populations, species and their habitats. It assesses the impact of the proposal, contains measures to avoid and minimise impacts and describes and quantifies the biodiversity credits required to offset the residual impacts of the proposal on biodiversity values.

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Wingecarribee Shire Council, and in accordance with the objectives of the BOS.

1.2 Site Location and Description

The Robertson Hotel is situated at 1 Fountaindale Road, Robertson, NSW, 2577 (the 'subject property') (**Figure 1-1**). The subject property encompasses approximately 5.03 ha and is located within the Wingecarribee Local Government Area (LGA). The subject property is zoned as 'E3 – *Environmental Management*':

Objectives of the zone:

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values;
- To provide for a limited range of development that does not have an adverse effect on those values;
- To encourage the retention of the remaining evidence of significant historical and social values expressed in existing landscape and land use patterns;
- To minimise the proliferation of buildings and other structures in these sensitive landscape areas;
- To provide for a restricted range of development and land use activities that provide for rural settlement, sustainable agriculture, other types of economic and employment development, recreation and community amenity in identified drinking water catchment areas; and
- To protect significant agricultural resources (soil, water and vegetation) in recognition of their value to Wingecarribee's longer term economic sustainability.

The subject property is bounded by the Illawarra Highway to the north and Fountaindale Road to the west and the Unanderra-Moss Vale railway line to the south.

The subject land covers an area of approximately 4 ha of land including 3.3 ha of vegetation and 0.7 ha of existing infrastructure. It is situated within a transition area between bushland and urban landscapes. The Robertson Hotel grounds encompass the historic Robertson Hotel, and its well-manicured gardens with the peripheries of the subject land comprised of remnant rainforest and scattered woodland.

1.3 Proposed Development

The proposed DA includes the construction of a new eastern-wing of the Robertson Hotel, eight two-storey eco-cabins, 12 two-storey villas and includes ancillary facilities and infrastructure (roads and paths). The subject land is mapped as Fire Prone Land (Peterson 2020) and as such, the creation of a 2.1 ha Asset Protection Zone (APZ) will be required around the subject land.

Impacts to vegetation required to facilitate the proposed development are presented in **Table 1-1**. The number and species of trees impacted by the development have been determined in consultation with the final architectural plans and the associated tree plans produced for the subject property.

Table 1-1. Impacts to vegetation to facilitate development.

Vegetation type	Removed (ha)	APZ Managed (ha)	Total (ha)
Intact native bushland	0.21	0.42	0.63
Native regrowth	0.21	0.43	0.64
Modified native bushland	0.01	0.025	0.035
Grassland	0.28	0.34	0.62
Manicured Garden	0.48	0.89	1.37

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the consent authority, Wingecarribee Shire City Council.

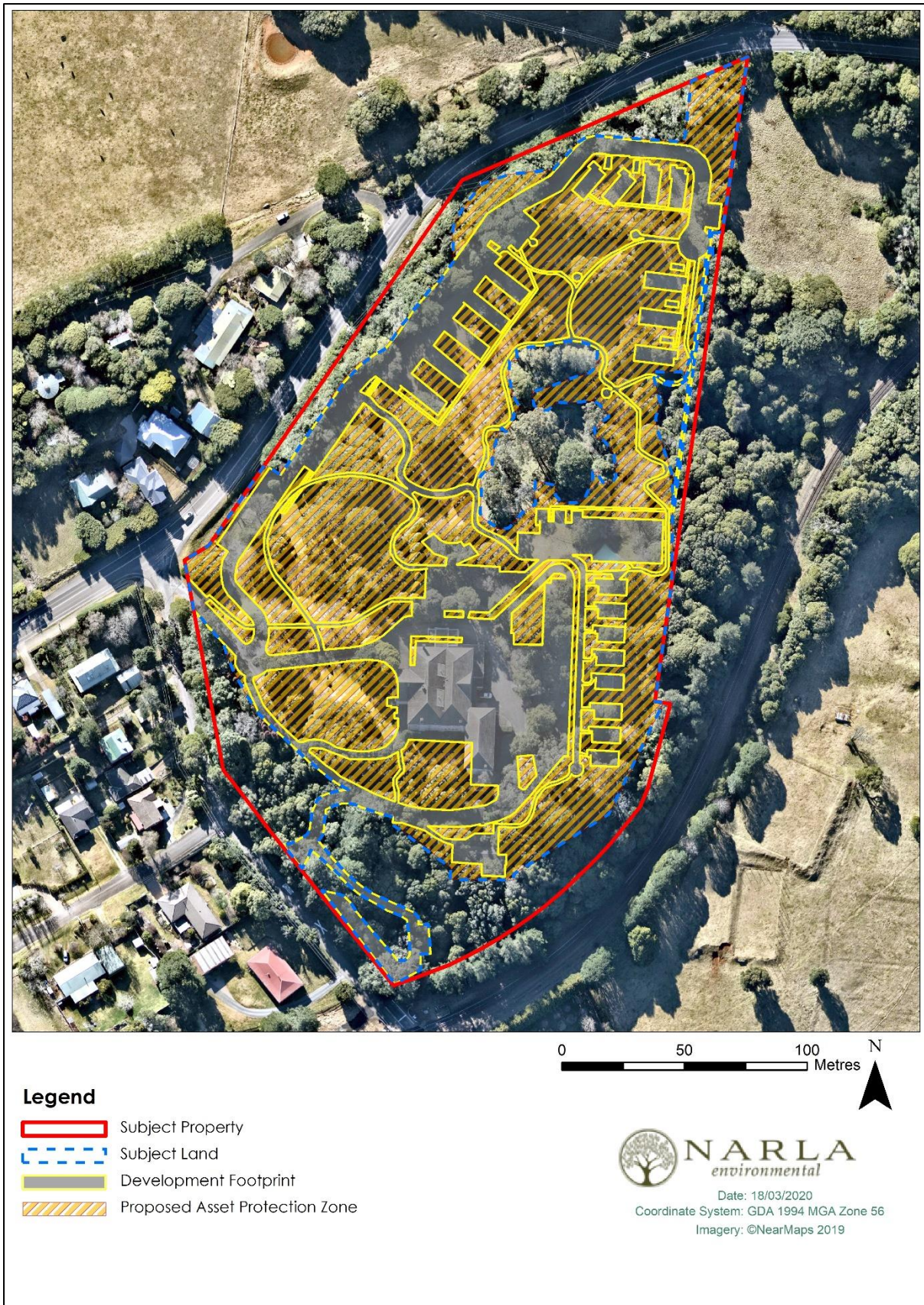


Figure 1-1. Site overview showing proposed development footprint and proposed bushfire APZ. Derived from plans

1.4 Sources of Information Used

A thorough literature review was undertaken into the ecology in the locality and Wingecarribee LGA. Relevant data and literature reviewed in preparation of this report included:

- Relevant State and Commonwealth Databases:
 - NSW BioNet. The website of the Atlas of NSW Wildlife (OEH 2019a)
 - NSW Bionet. Threatened Biodiversity Data Collection (OEH 2020a)
 - NSW Bionet. Vegetation Classification System (OEH 2020b)
 - State Environmental Planning Policy No. 14 – Coastal Wetlands
 - NSW Clip & Ship: Wingecarribee LGA
- NSW Scientific Committee Final Determinations for:
 - Robertson Rainforest in the Sydney Basin Bioregion – endangered ecological community listing (NSW Scientific Committee 2011a)
 - Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions (NSW Scientific Committee 2017)
 - Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion – Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act (NSW Scientific Committee 2011b)
- Commonwealth Approved Conservation Advice for:
 - Upland Basalt Eucalypt Forest of the Sydney Basin Bioregion ecological community (DoEE 2011)
- Vegetation Mapping:
 - Wingecarribee Biodiversity Strategy (Phase 1) – Vegetation Mapping (Ecological 2003)
 - New South Wales Vegetation Information System (VIS) 2.1 (OEH 2017)
- NSW State Guidelines:
 - Threatened Species Survey and Assessment: Guidelines for activities and activities. Working Draft (DEC 2004)
 - Threatened species survey and assessment guidelines: field survey methods for fauna: Amphibians (DEC 2009)
 - NSW Guideline to Surveying Threatened Plants (OEH 2016b)
 - 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH 2018c)
 - Guidance to assist a decision-maker to determine a serious and irreversible impact (OEH 2017c)
- Council Documents:
 - Wingecarribee Local Environmental Plan (WLEP) 2010
 - Robertson Village Development Control Plan (DCP) 2017
 - Wingecarribee Shire Council Flora and Fauna Assessment Guidelines for Development Applications 2013
 - Wingecarribee Shire Council - Checklist for the assessment of a Flora and Fauna Report
 - Wingecarribee Biodiversity Strategy Phase 1 Maps – Local Corridors, Regional Corridors, Priority habitat and Corridors for Conservation (Ecological 2003)
 - Weeds declared in the South East (Wingecarribee Shire Council) (DPI 2019)

Preparation of this BDAR also involved the review of the following accompanying project documents:

- Proposed Architectural Plan (XPACE Design Group 2019)
- Bushfire Hazard Report for 1 Fountaindale Road, Robertson, 2577 (Peterson Bushfire 2019)

Online databases and literature review were used to gain an understanding of the natural environment and ecology of the subject land and its surrounds. Searches using NSW Wildlife Atlas (BioNet) were conducted to identify current threatened flora and fauna records within a 10km² search area centred on the subject land. These data were used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent the subject land and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the subject land and assist in determining whether any threatened flora or ecological communities may occur there (Hazellon 1992).

1.5 Aim and Approach

This report has been prepared in accordance with the BAM (OEH 2017a) and aims to:

- Describe the biodiversity values present within the subject land, including the extent of native vegetation, vegetation integrity and the presence of threatened ecological communities (TECs);
- Determine the habitat suitability within the subject land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and serious and irreversible impacts (SAls) within the subject land;
- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e. ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker (Wingecarribee Council) as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

2 Methodology

2.1 IBRA Bioregions and Mitchell Landscapes

The subject land occurs within the Moss Vale Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion (version 7) subregion of the Sydney Basin IBRA Bioregion.

New South Wales Landscapes Mapping: Background and Methodology (Mitchell 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term. The subject land occurs entirely within the 'Robertson Basalts' NSW Mitchell Landscape (**Figure 2-1**).

2.1.1 Robertson Basalts (Moss Vale Basalts)

Flat top hills and small plateau standing above undulating shale hills of the Moss Vale Highlands landscape on Tertiary basalt flows, general elevation 800 to 850m, local relief 40m. Red and red-brown structured loam and clay loam with uniform or gradational profiles, good water holding capacity and high fertility. Tall forests of; *Eucalyptus piperita* (Sydney peppermint), *Eucalyptus elata* (River Peppermint), *Eucalyptus fastigata* (Brown Barrel), *Eucalyptus viminalis* (Manna Gum), *Eucalyptus moluccana* (Coastal Grey Box), *Eucalyptus stellulata* (Black Sallee) and *Eucalyptus pauciflora* (Snow Gum). Rainforest elements in protected gorges; *Doryphora sassafras* (Sassafras), *Ceratopetalum apetalum* (Coachwood), *Eucryphia moorei* (Eastern Leatherwood), *Diploglottis australis* (Native Tamarind), *Schizomeria ovata* (White Cherry), *Acmena smithii* (Lilly Pilly), *Acacia melanoxylon* (Blackwood), *Ficus obliqua* (Small-leaved Fig) with *Dicksonia Antarctica* (Soft Tree-fern) and *Cyathea australis* (Rough tree-fern) understorey.

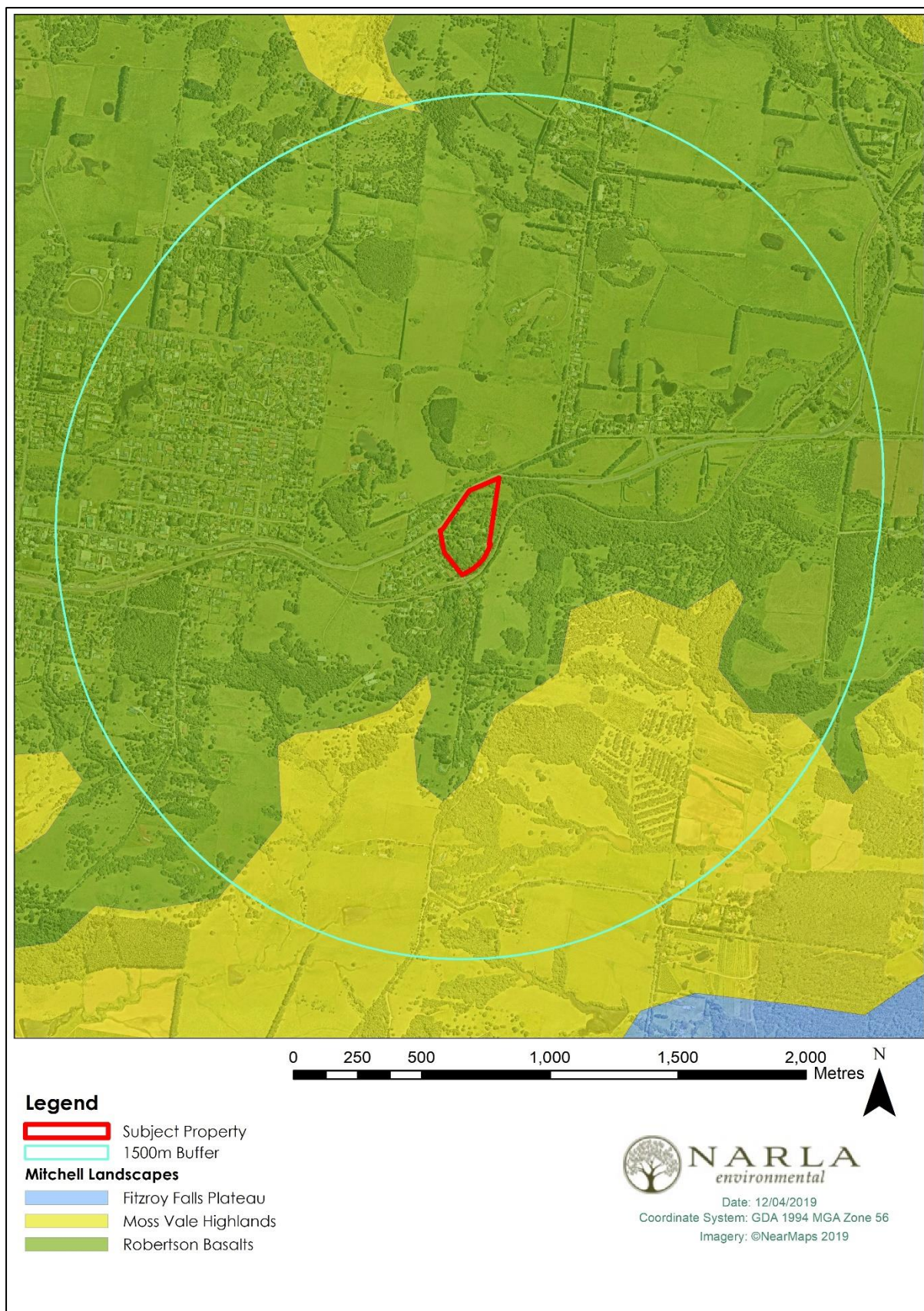


Figure 2-1. Location map identifying NSW Mitchell Landscapes within 1500m buffer.

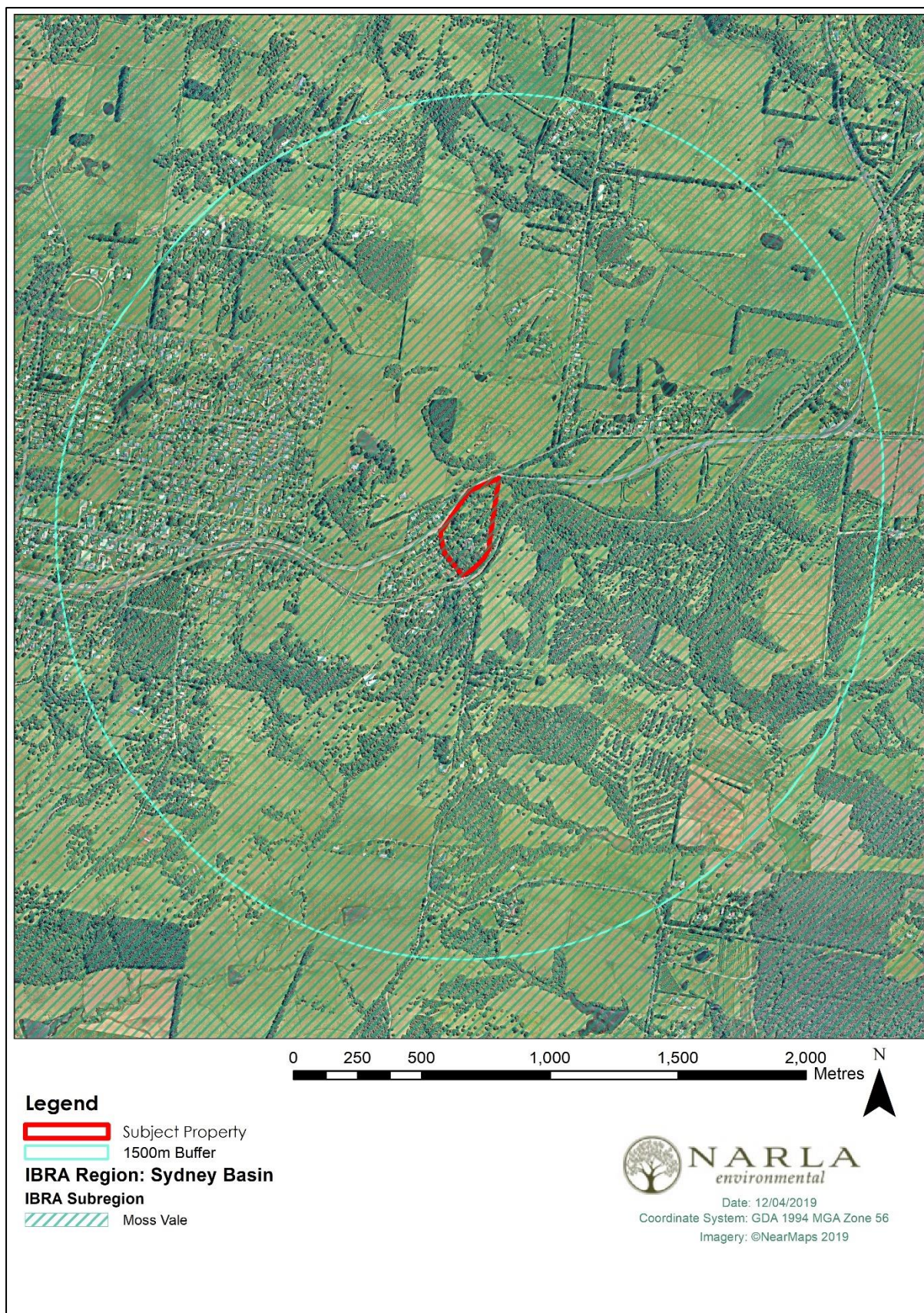


Figure 2-2. Location map identifying IBRA Subregion within 1500m buffer.

2.2 Site Description and Landscape Features

This section details the landscape features and associated habitat values in and around the subject land. A table is provided which details the landscape features as required by the BAM (**Table 2-1**).

2.2.1 Topography, Geology and Soils

The subject land is situated within the 'Robertson' soil landscape identified by Hazelton (1992). The Robertson soil landscape is characterised by undulating to rolling hills with flat-topped ridges on basalt and basanite. Relief 30-100m, Slopes 5-15%. Remnant knolls and small rounded flat-topped crests. Extensively cleared with isolated stands of low woodland and closed-forest. Elevation ranges between 757m above sea level (asl) in the south-east and 771m asl in the north-east of the site (Google 2019).

2.2.2 Hydrology

No watercourses or water bodies have been historically mapped within 1:25,000 topographical mapping (SIXMaps 2019). Overland stormwater flows across the site in a predominantly south-easterly direction, away from a high point in the north-western extent of the subject land. Two (2) man-made dams are located in the northwest extent of the subject land (**Figure 3-2**).

2.2.3 Biodiversity Values Mapping

The Biodiversity Values (BV) Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing (OEH 2019b). Biodiversity values have been mapped in the south of the subject land adjoining a large area to the east (**Figure 2-7**).

Table 2-1. Landscape features identified within the subject land and surrounding 1500m buffer.

Landscape Feature	Identification of Landscape Feature on Site
Native vegetation extent in 1500m buffer area	The 1500m buffer zone covers an area of approximately 850 ha (Figure 2-3). Within this, native vegetation covers approximately 730 ha. This area of native vegetation represents 85% of the 1500m buffer zone. The native vegetation cover observed results in the assessment area being assigned to the >70% cover class.
Cleared area within 1500m buffer	The total of cleared land within the assessment area surrounding the subject land covers approximately 127 ha (Figure 2-3). This area of cleared land accounts for approximately 15% of the land within the 1500m buffer zone.
Rivers and Streams (classified according to stream order)	No mapped watercourses occur within the subject land (Figure 2-4). A number of mapped watercourses occur within the 1500m buffer of the subject land. The watercourses range from 1 st order streams to 3 rd order streams and are primarily tributaries that form part of the catchment of Shoalhaven.
Wetlands (within, adjacent to and downstream of site)	No mapped wetlands occur within the subject land.
Connectivity features	The primary connectivity feature identified within the subject land is the native vegetation within the south-eastern extent of the site that connects directly to a strip of remnant, native vegetation that extends in an easterly direction away from the subject land toward the coast. The identified area of habitat connectivity between the subject land and native vegetation within the 1500m buffer zone has the potential to provide habitat for a number of threatened species, endangered populations and migratory species. The potential impacts of the proposed activity on such species is detailed further within Section 4 .
Areas of geological significance and soil hazard features	No areas of geological significance (karsts, caves, crevices or cliffs) were identified within the subject land. This was determined as a result of a comprehensive site-based assessment. No areas of soil hazards (acid sulphate soils, etc.) were identified within the subject land. This was determined as a result of a comprehensive desktop-based assessment.

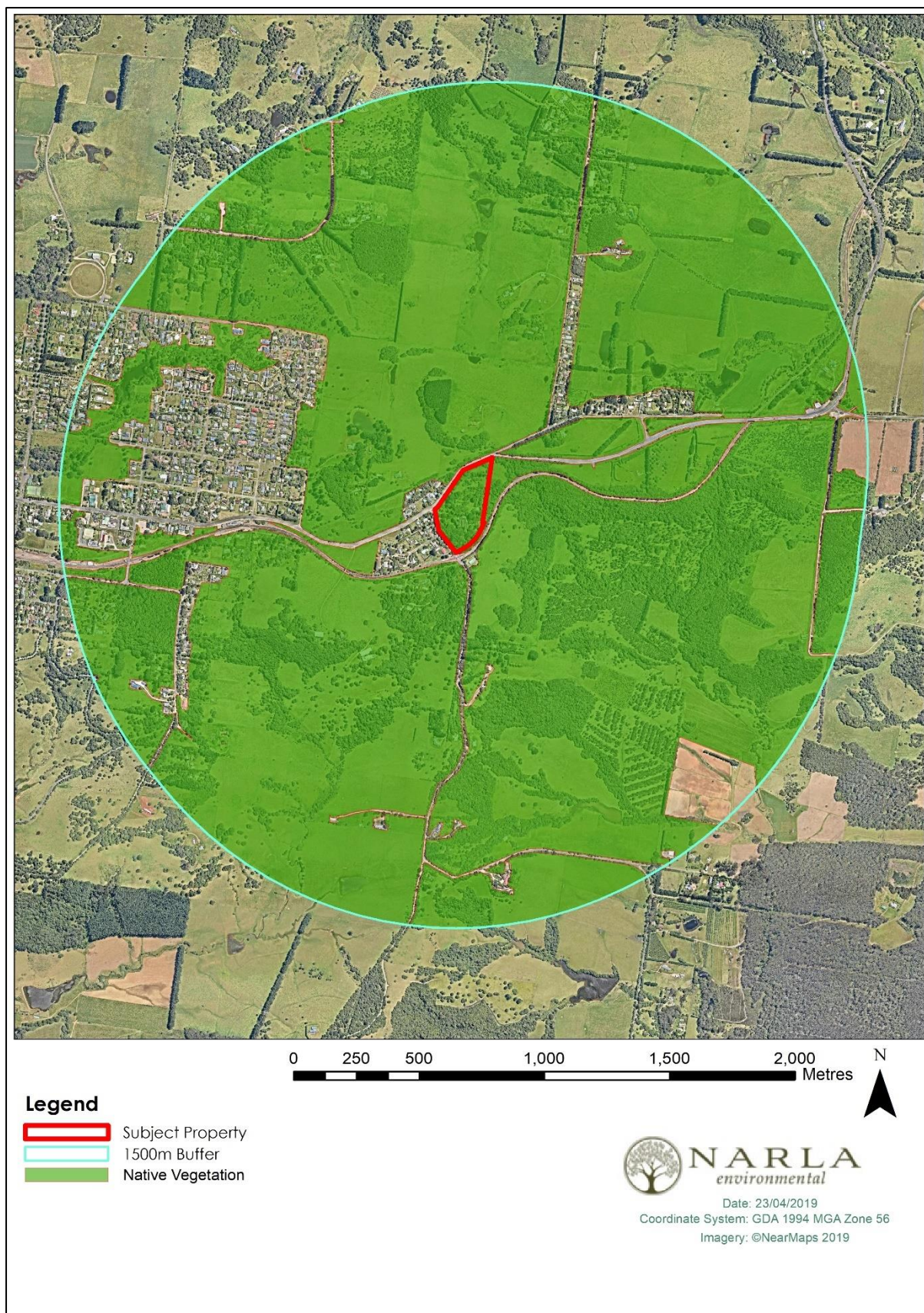


Figure 2-3. Location map identifying the extent of native vegetation occurring within the 1500m buffer surrounding the subject land.

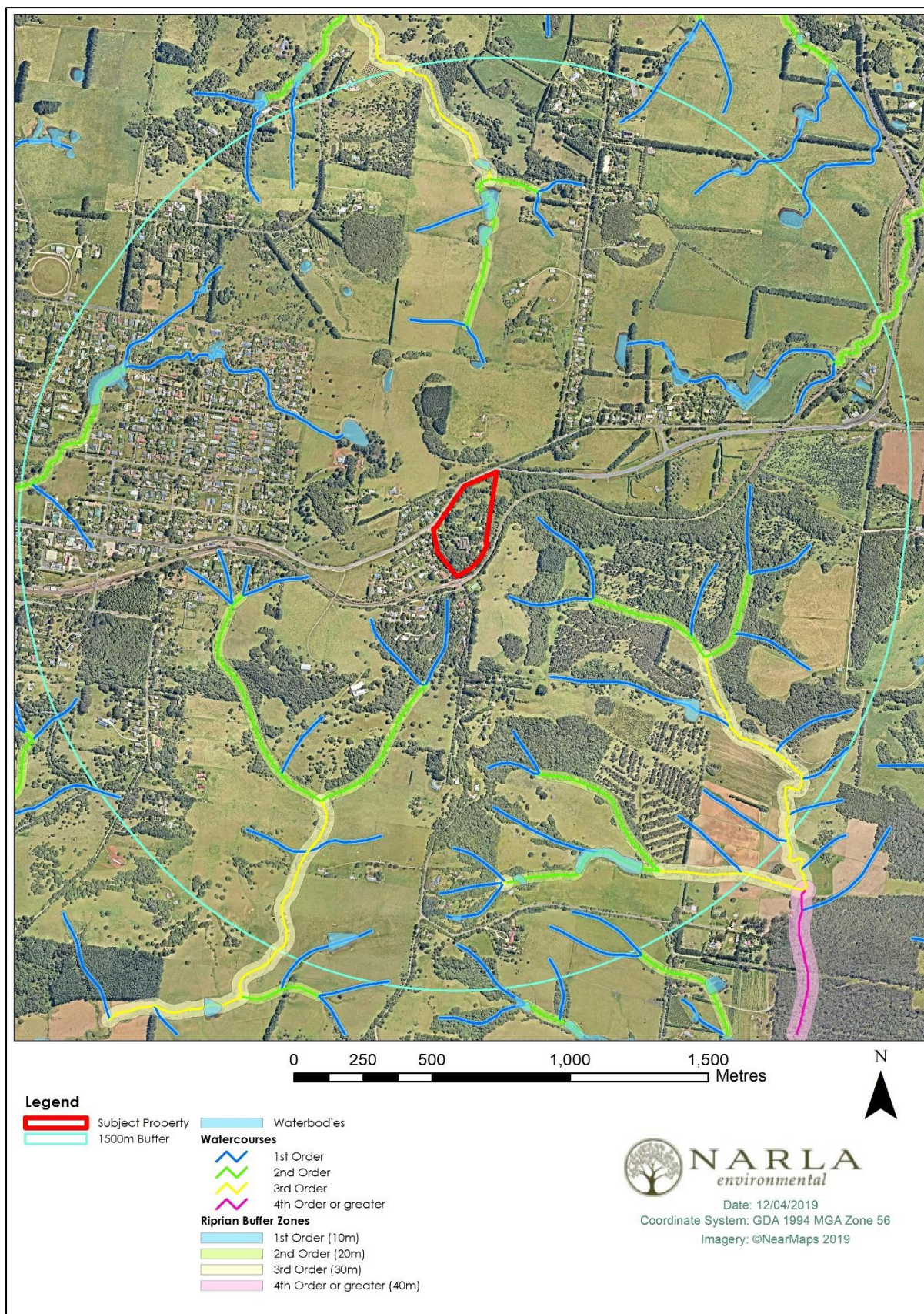


Figure 2-4. Location identifying rivers, streams, estuaries and riparian buffer zones occurring within the 1500m buffer.

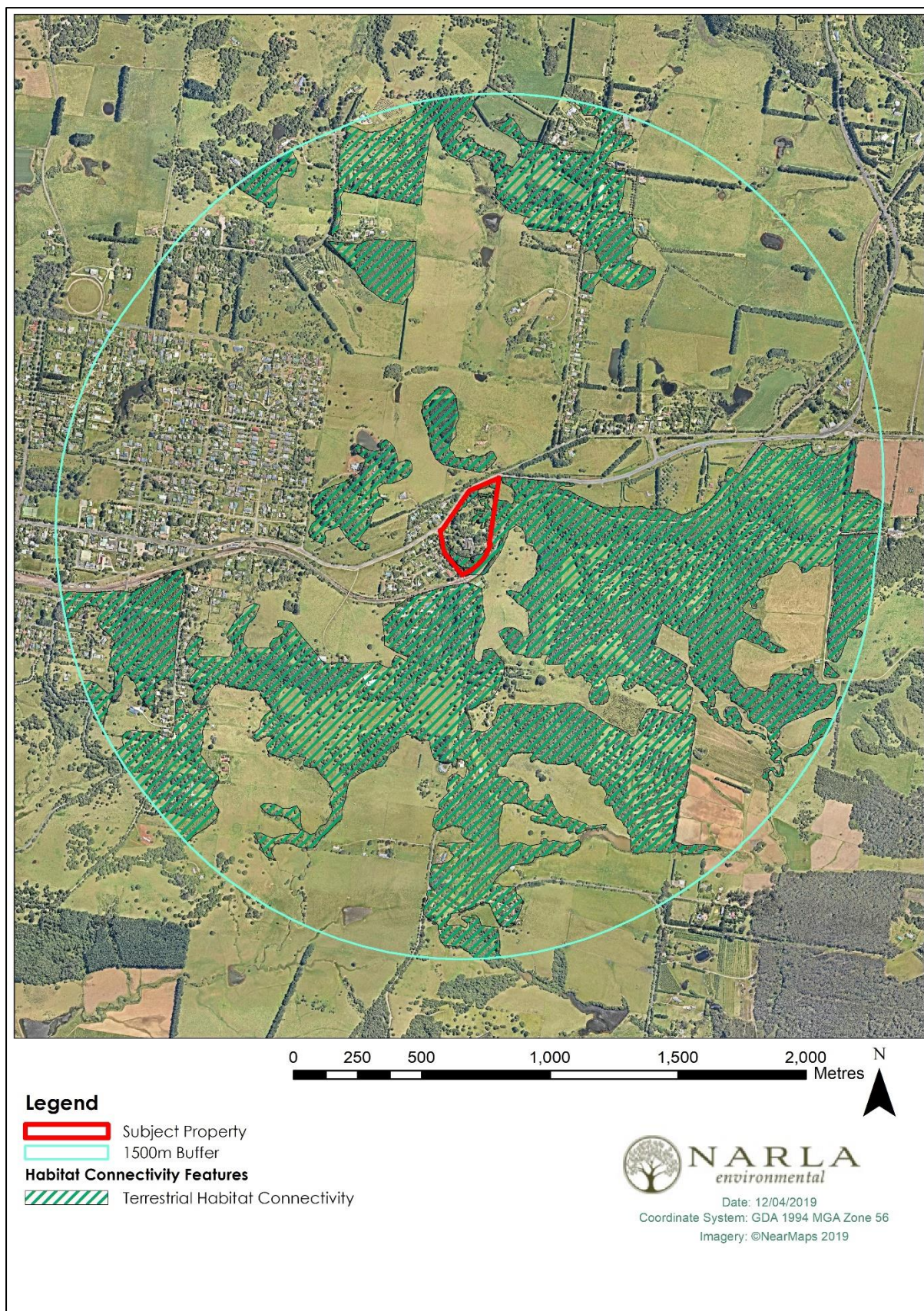


Figure 2-5. Location map identifying terrestrial habitat connectivity within the 1500m buffer.

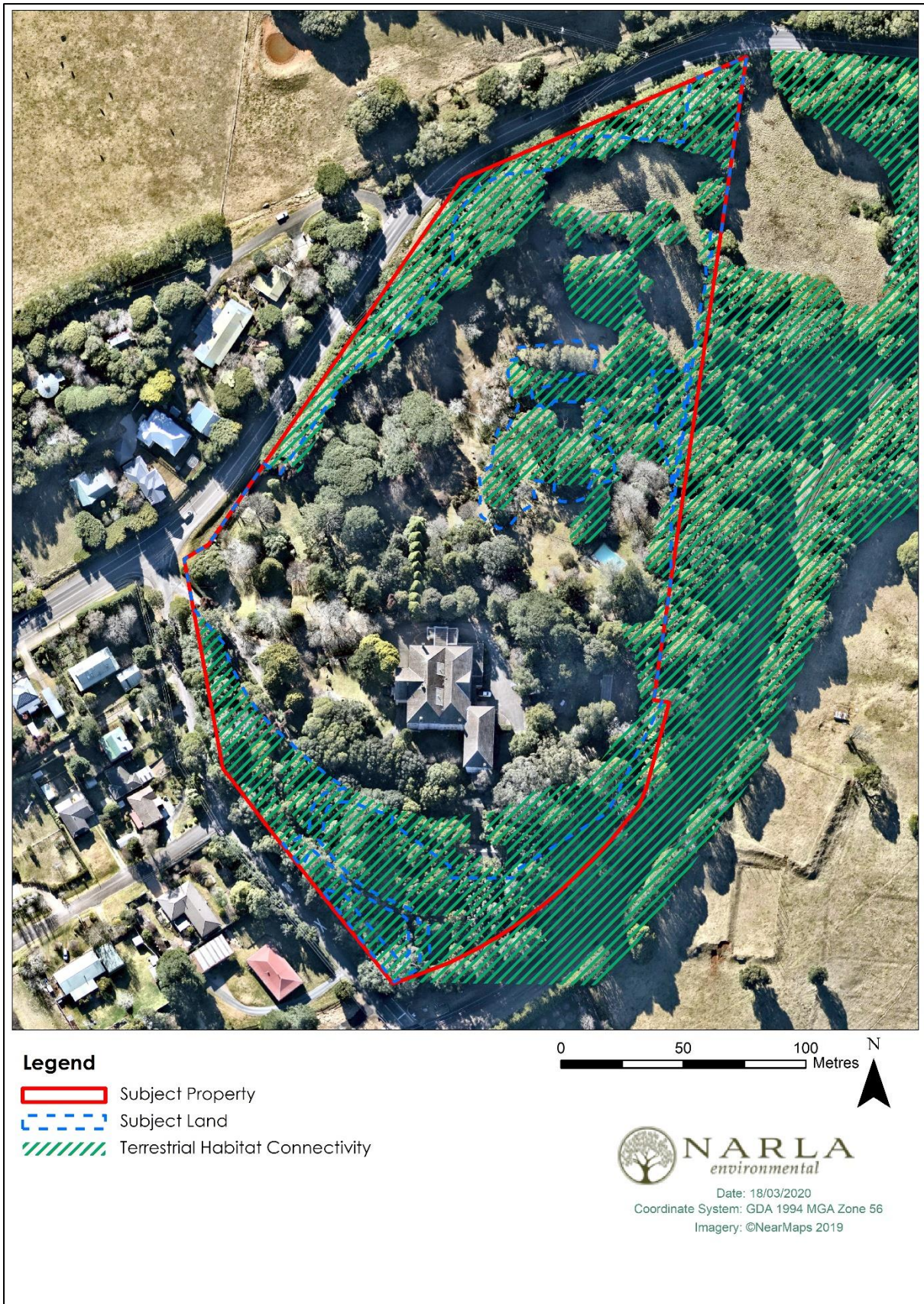


Figure 2-6. Site map identifying terrestrial habitat connectivity within the subject land.

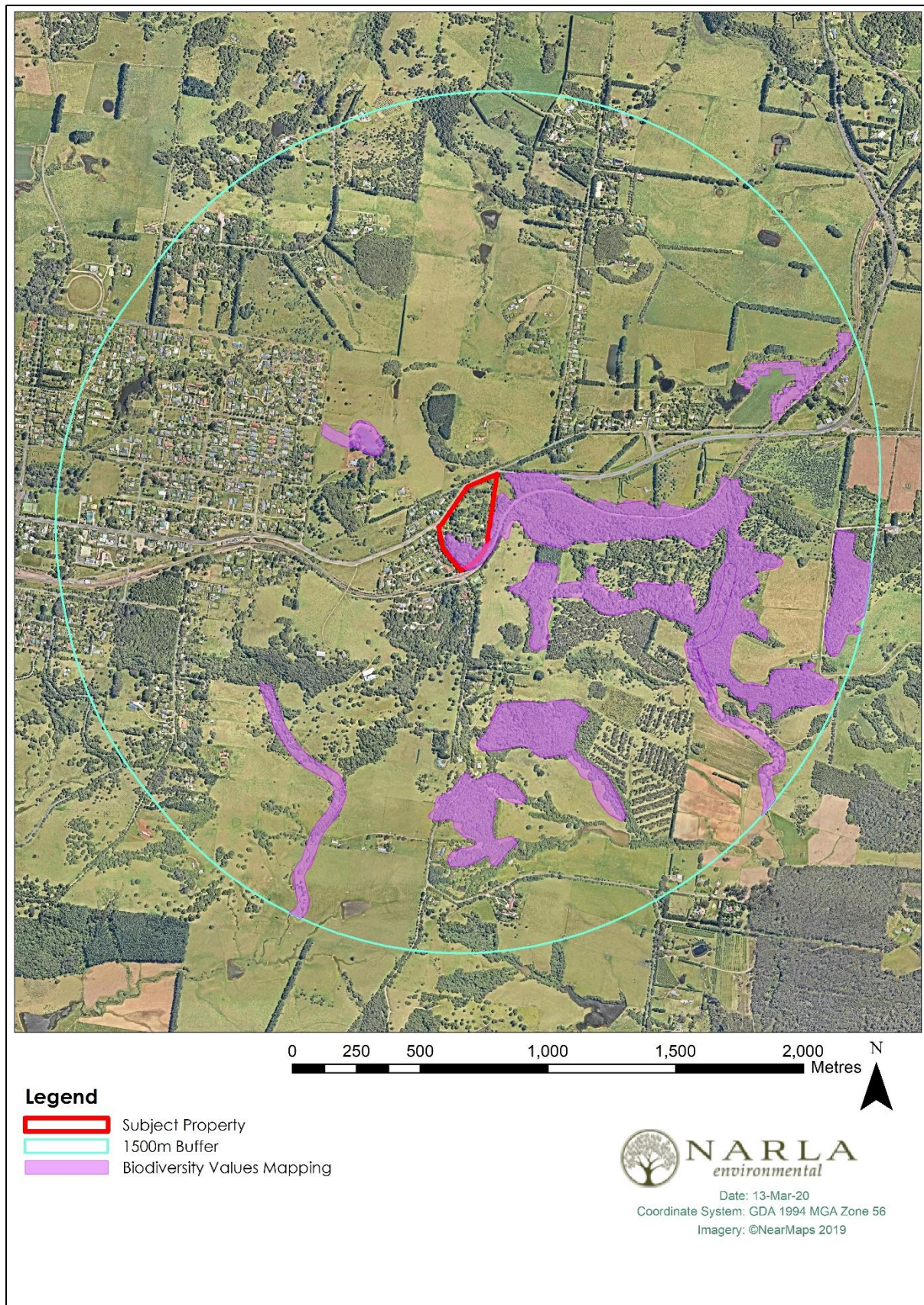


Figure 2-7. Biodiversity Values Mapping.

3 Native Vegetation

3.1 Assessing Native Vegetation Cover

Native vegetation cover and patch size have been assessed in accordance with Section 4.3 of the BAM (OEH 2017a). Components of the site context will be used in order to assess the suitability of habitat for threatened species within the subject land.

A buffer area of 1500m surrounding the outside edge of the boundary of the subject land was prepared in order to determine the extent of native vegetation within the surrounding area. Native vegetation was considered to cover approximately 730ha within the buffer circle and was assigned the >70% cover class (**Figure 2-3**).

3.2 Assessing Patch Size

Patch size as defined by the BAM as 'an area of native vegetation that:

- occurs on the development site or biodiversity stewardship site, and
- includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site' (OEH 2017a).

Patch size was calculated according to the above guidelines, and equated to >100 ha (**Figure 2-3**).

3.3 Historically Mapped Vegetation Communities

Vegetation mapping (Ecological 2003) historically mapped the subject land as containing a single vegetation community (**Figure 3-1**):

- Robertson Basalt Rainforest.

See **Figure 3-1** for the extent of this community within the subject land.

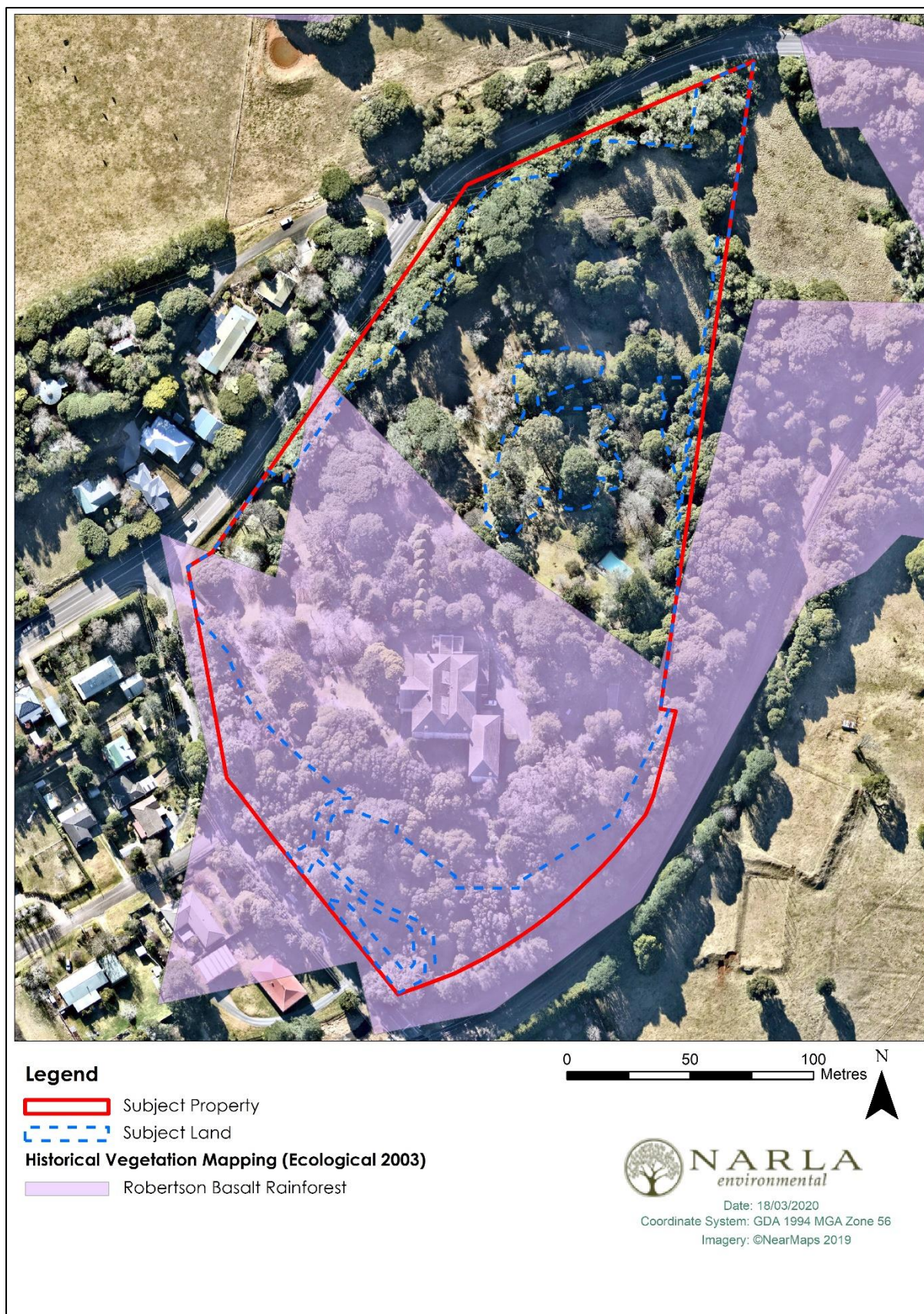


Figure 3-1. Historically mapped vegetation within the subject land (Eco Logical 2003).

3.4 Plant Community Types (PCT) Identified within the Subject Land

Site assessment conducted by Narla between 8th - 9th October 2018 and 20th – 21st March revealed the subject land was largely dominated by exotic, ornamental gardens, with significant patches of native vegetation occurring on the peripheries of the subject property.

The collection of structural and species composition vegetation surveys over transects and 20m x 20m quadrats informed the identification of one PCT. The characteristic features that lead Narla to select the PCT is provided in the table below (**Table 3-1; Table 3-2; Table 3-3**):

- PCT 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion (detailed in **Table 3-3**).

In accordance with the BAM, five 20m x 50m Vegetation Integrity Survey (VIS) plots were undertaken within native vegetation on the subject land (**Figure 3-2**).

3.4.1 Selection process for PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion

Our PCT selection was undertaken using information and databases provided in the BioNet Vegetation Classification System (OEH 2019). The steps taken to identify each PCT confirmed within the site is provided, along with evidence of selection in **Table 3-1** and **Table 3-2**.

Table 3-1 PCT 1129 Selection Criteria.

Selection Criteria	Search Tool
IBRA Bioregion	Sydney Basin
IBRA Subregion	Moss Vale
Dominant Upper Stratum Species	<i>Doryphora sassafras</i> , <i>Syzygium austral</i> , <i>Pittosporum undulatum</i> , <i>Alectryon subcinereus</i> , and <i>Hymenanthera dentata</i> .
Vegetation Formation	Rainforest
Reference	Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., 2010 Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0


The selection process delivered three candidate PCTs for this vegetation type:

- 769 - Coachwood - Lilly Pilly warm temperate rainforest in moist sandstone gullies, Sydney Basin Bioregion
- 1128 - Sassafras - Blackwood - Lilly Pilly temperate rainforest of the Robertson area, Sydney Basin Bioregion
- 1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion

Table 3-2. Justification for choosing PCT 1129. Dark border indicates the selected PCT.

Candidate PCT	Characteristic Canopy Tozer et al (2010)	Characteristic Shrub / Groundcover Tozer et al (2010)	Landscape Position/ Geology Tozer et al (2010)	Justification
769 - Coachwood - Lilly Pilly warm temperate rainforest in moist sandstone gullies, Sydney Basin Bioregion	A closed forest dominated by a canopy of <i>Ceratopetalum</i> <i>apetalum</i> , <i>Syzygium smithii</i> , <i>Doryphora sassafras</i> , <i>Acacia</i> <i>elata</i> ;	Shrubs include: <i>Backhousia myrtifolia</i> , <i>Callicoma serratifolia</i> , <i>Cyathea</i> <i>australis</i> , <i>Morinda jasminoides</i> , <i>Smilax</i> <i>australis</i> , <i>Tasmannia insipida</i> and <i>Todea Barbara</i> . Groundcovers generally include <i>Blechnum cartilagineum</i> ;	Occurs in moist gully heads and sheltered slopes below sandstone cliffs between 400 and 800m altitude n the Blue Mountains and on Budderoo and Moreton Plateaux	This PCT does not fit with the vegetation community present within the subject land. The landscape features characteristic of this PCT were not present within the subject land (e.g. occurs on elevations between 550 and 1000m, and the subject land is at 770m ASL).
1128 - Sassafras - Blackwood - Lilly Pilly temperate rainforest of the Robertson area, Sydney Basin Bioregion	A closed forest dominated by <i>Doryphora sassafras</i> , <i>Syzygium</i> <i>smithii</i> , <i>Acacia melanoxylon</i> , <i>Polyosma cunninghamii</i> and <i>Quintinia sieberi</i> ;	Shrubs include: <i>Pittosporum</i> <i>undulatum</i> , <i>Alectryon subcinereus</i> , <i>Coprosma quadrifida</i> , <i>Dicksonia</i> <i>Antarctica</i> , <i>Eustrephus latifolius</i> , <i>Hedycarya angustifolia</i> , <i>Marsdenia</i> <i>rostrate</i> , <i>Microsorium scandens</i> , <i>Myrsine howittiana</i> , <i>Notelaea</i> <i>venosa</i> , <i>Pandorea pandorana</i> , <i>Pyrrosia rupestris</i> and <i>Smilax australis</i> ; Groundcovers include: <i>Asplenium</i> <i>flabellifolium</i> , <i>Lastreopsis acuminata</i> , <i>Pellaea falcata</i> and <i>Urtica incisa</i> ;	Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.	This PCT does not fit with the vegetation community present within the subject land. The geography (Sydney area) that characterise this PCT were absent from the subject land.
1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	A closed forest dominated by <i>Doryphora sassafras</i> , <i>Syzygium</i> <i>smithii</i> , <i>Acacia melanoxylon</i> , <i>Polyosma cunninghamii</i> and <i>Quintinia sieberi</i> ;	Shrubs include: <i>Pittosporum</i> <i>undulatum</i> , <i>Alectryon subcinereus</i> , <i>Coprosma quadrifida</i> , <i>Dicksonia</i> <i>Antarctica</i> , <i>Eustrephus latifolius</i> , <i>Hedycarya angustifolia</i> , <i>Marsdenia</i> <i>rostrate</i> , <i>Microsorium scandens</i> , <i>Myrsine howittiana</i> , <i>Notelaea</i> <i>venosa</i> , <i>Pandorea pandorana</i> , <i>Pyrrosia rupestris</i> and <i>Smilax australis</i> . Groundcovers include: <i>Asplenium</i> <i>flabellifolium</i> , <i>Lastreopsis acuminata</i> , <i>Pellaea falcata</i> and <i>Urtica incisa</i> ;	Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.	This PCT fits with the vegetation community present within the subject land. This PCT was chosen as characteristic species were present within the subject land, with the position in the landscape (moist soil derived from Robertson basalt at 700m) and geography (southern Sydney Basin) matched the description by Tozer et al. (2010).

Table 3-3. PCT 1129 – Summary of vegetation condition within the subject land.

PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion					
					
Vegetation formation / Keith Class	KF_CH1 Rainforests / Southern Warm Temperate Rainforests				
Condition classes on Subject Land	Condition 1 (Remnant Canopy)	Condition 2 (Regrowth)	Condition 3 (Modified)	Condition 4 (Grassland)	Condition 5 (Manicured Gardens)
Extent within Subject Land (approximate)	0.63 ha	0.65 ha	0.036 ha	0.62 ha	1.36 ha
Description of PCT on Subject Land					
<p>The community was represented primarily by codominance of <i>Syzygium australe</i> (Brush Cherry) and <i>Doryphora sassafras</i> (Sassafras) supported by occasional representations of <i>Acacia melanoxylon</i> (Blackwood) where the community ecotones were evident. As a result of historical land practices, the mid-stratum was largely absent within community, however, scattered <i>Coprosma quadrifida</i> (Prickly Currant Bush) and <i>Alectryon subcinereus</i> (Wild Quince). The ground layer stratum was dominated by <i>Tradescantia fluminensis</i> (Trad), with scattered native ferns, climbers and sedges characteristic of the Sassafras – Blackwood – Lilly Pilly vegetation community, including <i>Gymnostachys anceps</i> (Settlers' Twine), <i>Pyrrosia rupestris</i> (Rock Felt Fern).</p>					

PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion			
Description of PCT in VIS			
Other Diagnostics Features: Closed forest with lianas and ferny groundcover.; Landscape Position: Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.			
Survey effort	<p>Five BAM plots were established:</p> <ul style="list-style-type: none"> One in Condition 1 (Remnant Canopy) One in Condition 2 (Regrowth) One in Condition 3 (Modified) One in Condition 4 (Grassland) One in Condition 5 (Manicured Gardens) 		
Justification of PCT Assignment	Characteristic Flora Species	Geology/Landscape	Geography and Other
	<p>This PCT was co-dominated by <i>Doryphora sassafras</i> and <i>Syzygium</i> spp. which is characteristic of PCT 1129.</p> <p>The following characteristic species were also present; <i>Pittosporum undulatum</i>, <i>Alectryon subcinereus</i>, and <i>Hymenanthera dentata</i>.</p>	<p>This PCT occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.</p>	<p>This PCT is likely confined to Moss Vale sub-region, possibly extending into Illawarra sub-region.</p>
Scientific Reference from VIS (OEH 2019)	Sub alliance 40 (Floyd 1990); RF p516 (Tozer et al. 2006)		
TEC Status (Biodiversity Conservation Act 2016)	Robertson Rainforest in the Sydney Basin Bioregion - Endangered Ecological Community		
Estimate of % of PCT Percent Cleared	85%		
SAIL Candidate Entry	<p>This TEC is identified as SAIL in NSW as it aligns with the EPBC Act critically endangered Robertson Rainforest in the Sydney Basin Bioregion TEC.</p> <p>The BAM-C will display the SAIL addition in early 2020.</p>		

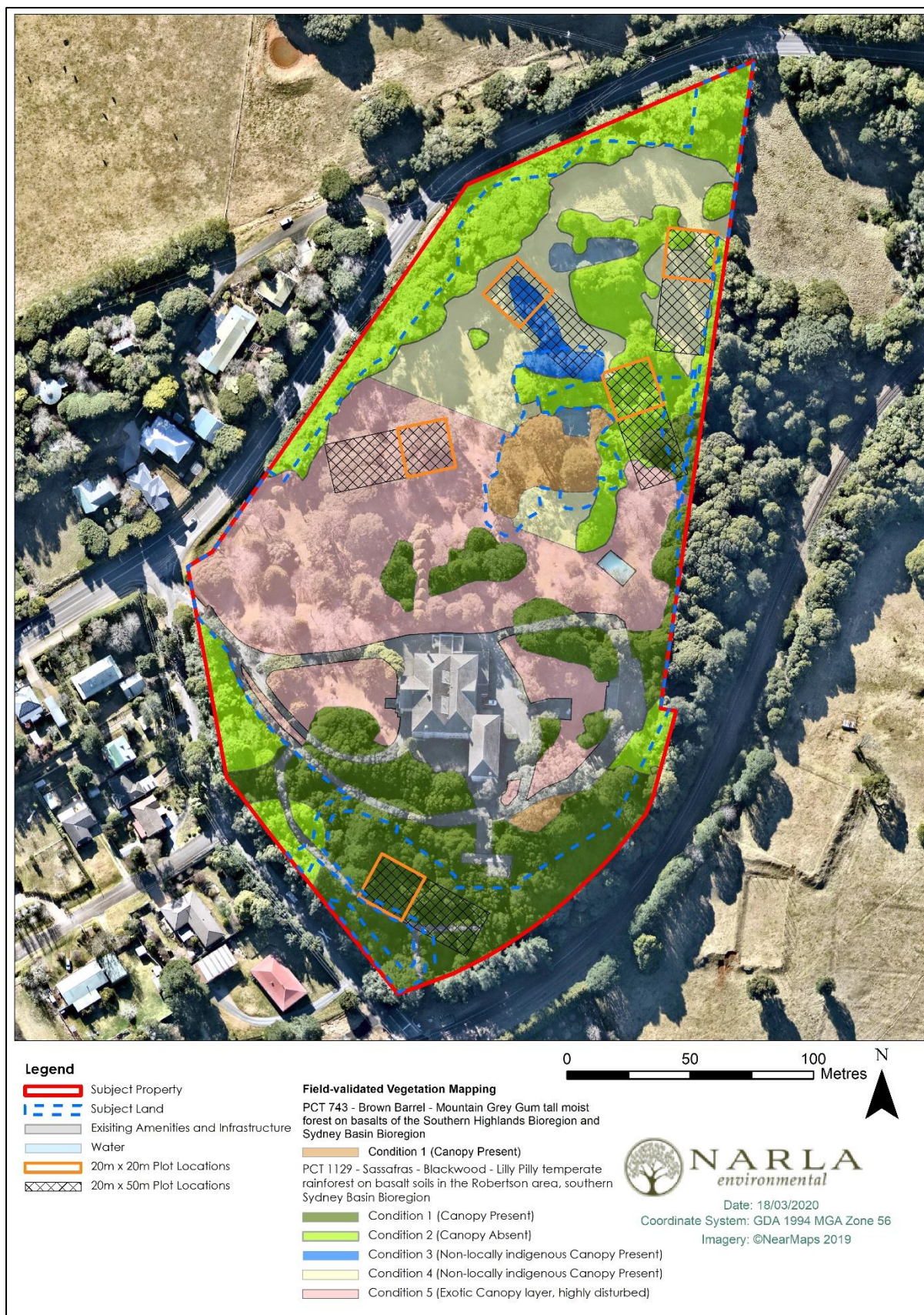


Figure 3-2. Site map identifying the extent of native vegetation; occurrence condition classes of PCT743 and PCT1129; and VIS plot locations within the subject land

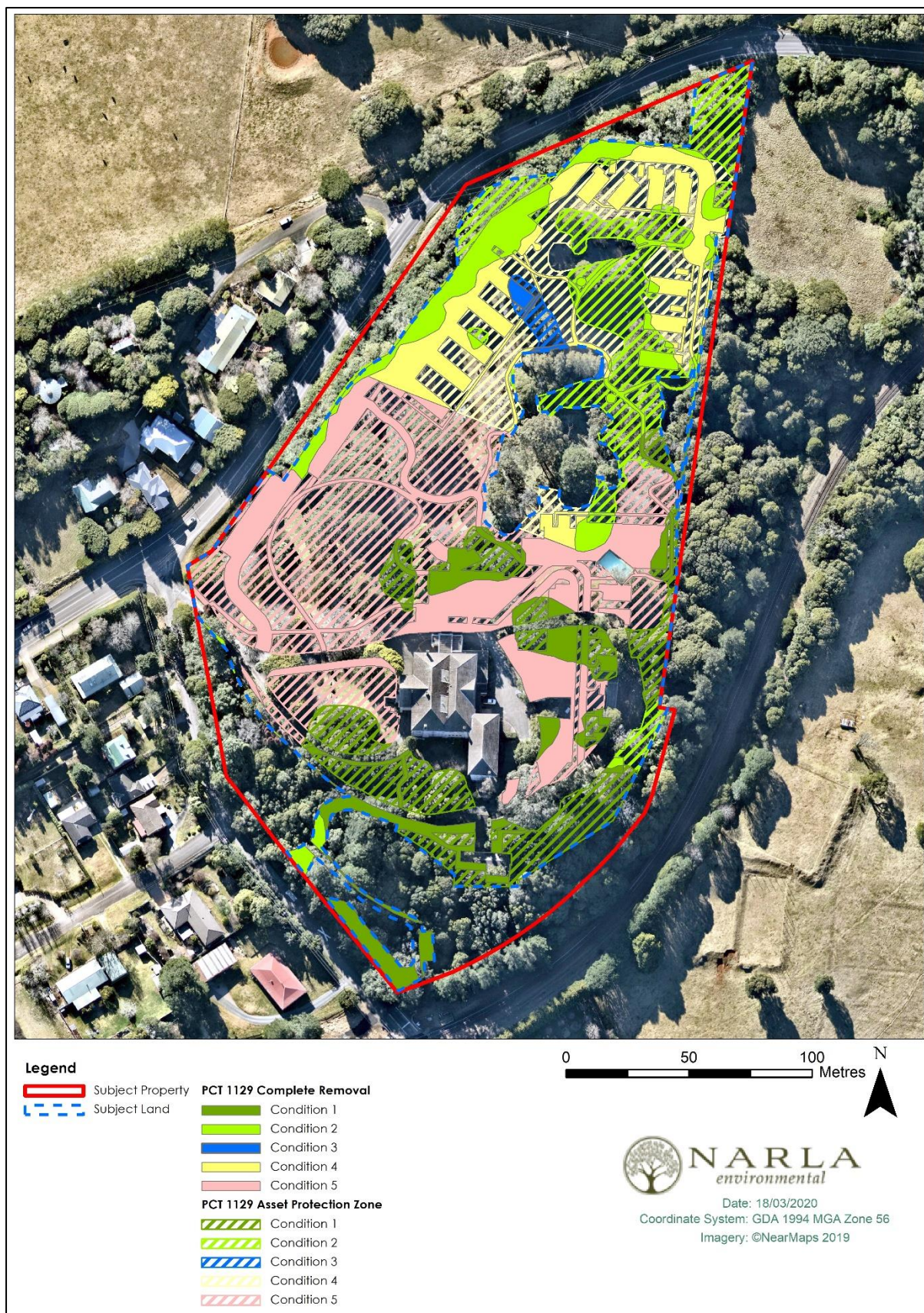


Figure 3-3. Subject map identifying the management zones of PCT1129 within the subject land

3.4.2 Vegetation Integrity Survey (VIS) plots

Six (6) BAM Vegetation Integrity Survey (VIS) Plots were undertaken within the subject land. Plot data gathered for each attribute used to assess the function of the subject land vegetation is detailed in **Appendix D**.

Vegetation Integrity Scores represented by existing vegetation within each vegetation zone is detailed in **Table 3-4**.

Table 3-4. Vegetation Zones and Vegetation Integrity Scores within the subject land.

Vegetation Zone	Plant Community Type	Patch Size (Patch Size Class)	Impact Area (ha)	Survey Effort	Vegetation Integrity Score (VIS)		Future VIS	Hollow Bearing-Trees	Change in total VIS
Condition 1 (Remnant Canopy)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.21 IPA: 0.42	One 1000m ² (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 59.5	VIS Score = 57.1	Cleared: 0 IPA: 2.5	Yes	-57.1
					Structure Score: 59.6				
					Function Score: 52.7				
Condition 2 (Regrowth)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.21 IPA: 0.43	One 1000m ² (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 81.3	VIS Score = 58.2	Cleared: 0 IPA: 2.8	Yes	-57.8
					Structure Score: 53.2				
					Function Score: 45.5				
Condition 3 (Modified)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.01 IPA: 0.025	One 1000m ² (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 52.7	VIS Score = 31.4	Cleared: 0 IPA: 2.5	No	-31.4
					Structure Score: 17.5				
					Function Score: 33.6				
Condition 4 (Grassland)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.28 IPA: 0.34	One 1000m ² (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 22.4	VIS Score = 1.8	Cleared: 0 IPA: 0	No	-1.8
					Structure Score: 0.1				
					Function Score: 2.2				
Condition 5 (Manicured Gardens)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.48 IPA: 0.89	One 1000m ² (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 57.4	VIS Score = 11.4	Cleared: 0 IPA: 0.9	No	-11.4
					Structure Score: 1.1				
					Function Score: 23.7				

3.4.2.1 Determining future vegetation integrity scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained (i.e. not degraded further over time), the assessor may determine that the future value of the relevant VI attributes are greater than zero (DPIE 2019c).

The subject land will be exposed to varying degrees of clearing due to the location of the proposed dwelling and the requirement for an APZ. Subsequently, each vegetation zone within the subject land has been divided into the following two (2) management zones to account for the varying clearing levels.

The attributes influencing future vegetation scores are detailed in **Table 3-5** and rely on details provided in Clarke Dowdle & Associates (2019) and NSW Rural Fire Service (2019).

Table 3-5. Management Zones within the subject land, and the relevant vegetation attributes (composition, structure and function) affecting future VI scores (as per Chris & Charlotte Webb Pty Ltd; Peterson Bushfire 2020).

Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed
Condition 1 IPA (Inner Protection Zone)	<ul style="list-style-type: none"> Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter and coarse woody debris. Groundcovers such as grasses regularly mowed or slashed to minimal height. 	<ul style="list-style-type: none"> Nil
Condition 1 Cleared	<ul style="list-style-type: none"> All vegetation will be removed 	<ul style="list-style-type: none"> Nil
Condition 2 IPA (Inner Protection Zone)	<ul style="list-style-type: none"> Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter Groundcovers such as grasses regularly mowed or slashed to minimal height. 	<ul style="list-style-type: none"> Grass and groundcover composition
Condition 2 Cleared	<ul style="list-style-type: none"> All vegetation will be removed 	<ul style="list-style-type: none"> Nil
Condition 3 IPA (Inner Protection Zone)	<ul style="list-style-type: none"> Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter and coarse woody debris. Groundcovers such as grasses regularly mowed or slashed to minimal height. 	<ul style="list-style-type: none"> Grass and groundcover composition
Condition 3 Cleared	<ul style="list-style-type: none"> All vegetation will be removed 	<ul style="list-style-type: none"> Nil
Condition 4 IPA (Inner Protection Zone)	<ul style="list-style-type: none"> Removal of all leaf litter Groundcovers such as grasses regularly mowed or slashed to minimal height. 	<ul style="list-style-type: none"> Grass and groundcover composition
Condition 4 Cleared	<ul style="list-style-type: none"> All vegetation will be removed 	<ul style="list-style-type: none"> Nil

Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed
Condition 5 IPA (Inner Protection Zone)	<ul style="list-style-type: none"> ▪ Removal of all leaf litter and coarse woody debris. ▪ Groundcovers such as grasses regularly mowed or slashed to minimal height. 	<ul style="list-style-type: none"> ▪ Shrub structure and composition ▪ Grass and groundcover composition
Condition 5 Cleared	<ul style="list-style-type: none"> ▪ All vegetation will be removed 	<ul style="list-style-type: none"> ▪ Nil

4 Threatened Species

4.1 Habitat Features for Species and Ecosystem Credit Fauna Species

The Narla Ecologists compiled a detailed summary of potential habitat for threatened fauna species, including both species credit and ecosystem credit threatened fauna species (**Table 4-1**).

Table 4-1. Fauna Habitat Values.

Habitat component	Site values
Coarse woody debris	Logs, debris piles and other waste material present, but these offer low value sheltering habitat, likely to be used only by common species.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Culverts, bridges, mine shafts, or abandoned structures	Absent.
Nectar/lerp-bearing Trees	Canopy trees, particularly <i>Eucalyptus cinerea</i> , <i>Eucalyptus elata</i> , <i>Eucalyptus scorparia</i> and <i>Eucalyptus fastigata</i> provide intermittent nectar and/or lerp sources for nomadic nectivores, such as Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and Little Lorikeet. Such food sources may also be used by Squirrel Glider and Eastern Pygmy Possum. These trees may also attract non-threatened fauna which form prey for threatened predatory fauna, such as Powerful Owl, Barking Owl, Masked Owl, Little Eagle, Square-tailed Kite, and White-bellied Sea-eagle.
Nectar-bearing shrubs	Scattered <i>Banksia</i> spp. provide foraging habitat provide intermittent nectar and/or lerp sources for nomadic nectivores, such as Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and Little Lorikeet. Such food sources may also be used by Eastern Pygmy Possum.
Koala and Greater Glider browse	All of the <i>Eucalyptus</i> spp. may provide forage for Koala and/or Greater Glider.
Large stick nests	No large stick nests suitable for threatened raptorial birds of prey were observed on the subject land.
Sap and gum sources	All of the <i>Eucalyptus</i> spp. may provide sap source for species that use it as foraging habitat. The understorey contains a few regrowth wattles which could provide gum for some species and are also an insect attractant for birds and bats. However, their low number and small size means foraging value is low. No evidence of gum excisions was noted.
She-oak fruit (Glossy Black Cockatoo feed)	<i>Casuarina glauca</i> and <i>C. cumminghamiana</i> subsp. <i>cumminghamiana</i> is present within the subject land.
Seed-bearing trees and shrubs	Fruit-bearing trees such as <i>Eucalyptus cinerea</i> , <i>Eucalyptus elata</i> , <i>Eucalyptus scorparia</i> and <i>Eucalyptus fastigata</i> , and fruit-bearing shrubs such as <i>Acacia baileyana</i> , <i>Acacia melanoxylon</i> may provide foraging habitat for Gang-gang Cockatoo.
Soft-fruit-bearing trees	Generally scattered native and ornamental trees which may provide fruit that could be consumed by Grey-headed Flying-fox, Superb, Rose-crowned, and Wompoo Fruit-doves.
Dense shrubbery and leaf litter	Some areas of dense shrubbery occur that may provide forage, shelter and/or breeding habitat for threatened mammals, such as Southern Brown Bandicoot.
Tree hollows	Twelve (12) hollow bearing trees were recorded in the subject land including large, medium and small hollows. No extra-large hollows (>15cm diameter) were found.
Decorticated bark	Absent
Wetlands, soaks and streams	Soaks and ponds were recorded in the subject land
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

Large hollow: 10-15cm, *Medium hollow: 5-9cm; Small 2-4cm

4.2 Candidate Ecosystem Credit Species

Ecosystem credit species associated with PCT 1229 are listed below in **Table 4-2**. No species predicted by the BAMC as potential ecosystem credits were excluded from the results displayed.

Table 4-2. Candidate Ecosystem Credits predicted to occur within the subject land

Ecosystem Species	BC Act Status	Excluded from Assessment?
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	Vulnerable	No
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)	Vulnerable	No
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	Vulnerable	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)	Vulnerable	No
<i>Kerivoula papuensis</i> Golden-tipped Bat	Vulnerable	No
<i>Ninox strenua</i> Powerful Owl (Foraging)	Vulnerable	No
<i>Pachycephala olivacea</i> Olive Whistler	Vulnerable	No
<i>Potorous tridactylus</i> Long-nosed Potoroo	Vulnerable	No
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	Vulnerable	No
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	Vulnerable	No
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	Vulnerable	No
<i>Tyto tenebricosa</i> Sooty Owl (Foraging)	Vulnerable	No

4.3 Candidate Species Credit Species

Species credit species are predicted by the BAMC following an assessment of geographic and habitat features in the credit calculator, such as site location (e.g. IBRA subregion), PCTs and condition, patch size and the area of surrounding vegetation within the 1,500 m buffer of the study area. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as candidate species for assessment. The list of credit species predicted to occur within the subject land at any stage during their life-cycle is presented (Table 4-3).

Table 4-3. Candidate fauna species credits predicted to occur within the subject land.

Species	BC Act Listing	Included in Assessment?	Targeted Survey/ Export Report Required/ Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	Vulnerable	Yes	Yes, targeted surveys undertaken during October 2018 and the species was not detected.	High - 2	Yes
<i>Cercartetus nanus</i> Eastern Pygmy-possum	Vulnerable	Yes	Yes, targeted survey undertaken by Ecologists using motion-activated cameras and nocturnal spotlighting during autumn (March) 2019 and the species was not detected.	High - 2	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	Vulnerable	No, the subject land does not contain any caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding. This confirmation was informed by assessment of species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	N/A	N/A	No
<i>Mixophyes balbus</i> Stuttering Frog	Endangered	Yes.	Yes, targeted survey undertaken by Ecologists using call playback and nocturnal spotlighting during autumn (March) 2019 and the species was not detected.	Very High - 3	No
<i>Myotis macropus</i> Southern Myotis	Vulnerable	Yes	Yes, targeted survey undertaken by Ecologists using harp traps and ultrasonic acoustic detectors during autumn (March) 2019 and the	High - 2	No

Species	BC Act Listing	Included in Assessment?	Targeted Survey/ Export Report Required/ Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			species was not detected.		
<i>Ninox strenua</i> Powerful Owl (Breeding)	Vulnerable	No, the subject land does not contain any living or dead trees with hollows greater than 20cm in diameter	N/A	High - 2	Yes
<i>Pteropus poliocephalus</i> Grey-headed Flying-Fox (Breeding)	Vulnerable	No, the subject land does not contain any known former or active roost camps for this species. No active camps occur within the immediate vicinity of the subject land.	N/A	High - 2	No
<i>Tyto tenebricosa</i> Sooty Owl (Breeding)	Vulnerable	No, the subject land does not contain any living or dead trees with hollows greater than 20cm in diameter or caves, cliff lines or ledges	N/A	Very High - 3	No

4.4 Targeted Species Credit Surveys

Targeted surveys were carried out within the approved survey period for the species targeted as identified within the BAMC (**Table 4-4; Table 4-5**) and were implemented in accordance with within section 6.5 of the BAM and all relevant OEH threatened species survey guidelines.

Targeted surveys for candidate species credit species were undertaken at two separate time points in 2018 and 2019, the weather conditions observed during these survey periods are outlined in **Table 4-2** below.

Table 4-4. Weather conditions taken from the nearest weather station (Moss Vale) in the lead up and during the field survey (BOM 2019a) (Survey dates in bold).

Timing/ Activities	Personnel	Date	Day	Temperature		Rain (mm)	Max wind gust		Relative Humidity at 9 am (%)
				Min (°C)	Max (°C)		Dir	Spd km	
Lead up to the survey	-	1-Oct-18	Mo	2.2	19.7	0	NNE	37	51
		2-Oct-18	Tu	2.4	23.0	0.2	ENE	41	32
		3-Oct-18	We	11.2	20.6	0	WSW	59	29
		4-Oct-18	Th	10.8	11.3	3.4	SSE	54	n.d
		5-Oct-18	Fri	7.9	12.5	9.4	SE	57	n.d
		6-Oct-18	Sa	5.7	14.0	0.6	SSE	37	98
		7-Oct-18	Su	6.3	12.9	0.4	SE	52	n.d
Site Assessment (Vegetation Mapping, Targeted Flora Survey) & Targeted Fauna Survey	Alexander Graham & Nathan Banks	8-Oct-18	Mo	8.5	17.6	7.6	S	39	n.d
Site Assessment (Vegetation Mapping, Targeted Flora Survey) & Targeted Fauna Survey	Alexander Graham & Nathan Banks	9-Oct-18	Tu	8.1	22.5	0	SE	41	n.d
Lead up to the survey	-	13-Mar-19	We	12.0	17.6	0	SSE	35	88
		14-Mar-19	Th	12.5	22.1	2.2	NE	44	95

Timing/ Activities	Personnel	Date	Day	Temperature		Rain (mm)	Max wind gust		Relative Humidity at 9 am (%)
				Min (°C)	Max (°C)		Dir	Spd km	
		15-Mar-19	Fr	13.3	18.6	16.8	S	44	95
		16-Mar-19	Sa	13.1	19.6	5.0	SSE	43	96
		17-Mar-19	Su	14.6	16.2	5.2	SSW	46	91
		18-Mar-19	Mo	12.4	18.6	50.0	WNW	41	97
		19-Mar-19	Tu	14.2	19.9	10.6	SSE	35	97
Site Assessment (Vegetation Mapping, BAM Plots, Targeted Flora Survey, Targeted Fauna Survey)	Alexander Graham & David Hancock	20-Mar-19	We	15.8	23.1	14.6	SE	30	94
Site Assessment (Vegetation Mapping, BAM Plots, Targeted Flora Survey, Targeted Fauna Survey)	Alexander Graham & David Hancock	21-Mar-19	Th	16.1	22.4	0.6	SE	28	96
Targeted Fauna Survey	Stefan Giessler	22-Mar-19	Fr	14.2	22.7	0.2	WNW	46	97
Targeted Fauna Survey	Stefan Giessler	23-Mar-19	Sa	15.7	26.9	1.0	NE	31	88
Targeted Fauna Survey	Stefan Giessler	24-Mar-19	Su	16.3	24.5	0.2	N	31	92
Targeted Fauna Survey	Stefan Giessler	25-Mar-19	Mo	17.6	20.9	0.2	WNW	72	69
Targeted Fauna Survey	Stefan Giessler	26-Mar-19	Tu	9.5	18.9	0.4	WSW	57	56
Targeted Fauna Survey	Stefan Giessler	27-Mar-19	We	4.8	17.8	0	ENE	30	95
Targeted Fauna Survey	Stefan Giessler	28-Mar-19	Th	9.3	22.7	0	N	39	83
Targeted Fauna Survey	Stefan Giessler	29-Mar-19	Fr	13.4	24.2	0	NNE	44	73

4.4.1 Fauna Species Credit Survey

A total of four (4) threatened fauna species were identified with potential to occur within the subject land (**Table 4-5**). Details of each targeted fauna survey technique are outlined below.

Table 4-5. Threatened Fauna species identified with potential to occur within the subject land

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo										✓		
<i>Cercartetus nanus</i> Eastern Pygmy-possum			✓									
<i>Mixophyes balbus</i> Stuttering Frog			✓									
<i>Myotis Macropus</i> Southern Myotis			✓									
Key	✓ = Surveyed		= Optimum Survey Period									

4.4.1.1 Targeted Microbat Survey

One threatened microbat species, *Myotis macropus* (Southern Myotis), was identified by the BAMC. The species had potential to occur within the subject land and therefore required targeted survey to determine its presence. In order to determine the presence of Southern Myotis within the subject land, targeted surveys in accordance with the NSW survey guide for threatened bats and their habitats were undertaken (OEH 2018c).

Two harp traps were established within flyways in the subject land (**Figure 4-1**), and two acoustic detection units (Wildlife Acoustics SongMeter SM4BAT) were deployed within suitable areas identified within the subject land within close proximity to waterbodies and flyways (**Figure 4-1**). The targeted survey effort undertaken for this species is detailed in **Table 4-6** below.

Table 4-6. Microbat targeted survey effort undertaken within the subject land

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Myotis macropus</i> (Southern Myotis)	Harp Trap	2 traps over 8 nights between approximately 8:00pm and 6:00am	No, refer to Appendix B for the full list of species identified within the site.
	Acoustic Detection Device	2 devices over 9 nights between approximately 6:30pm and 7:30am	No, refer to Appendix B for the full list of species identified within the site.

Southern Myotis were not detected within the subject land during the optimal survey period (Knock 2019). The proponent is not required to purchase and retire Biodiversity Offset Credits for these species.

4.4.1.2 Targeted Small Mammal Survey

One threatened small mammal species, *Cercartetus nanus* (Eastern Pygmy Possum), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their presence. In order to determine the presence of these species within the subject land, targeted surveys in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 4-7** below.

Table 4-7. Small mammal targeted survey effort undertaken within the subject land.

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Motion Sensing Arboreal Camera Trapping	5 devices over 8 days + nights running continuously	No, refer to Appendix B for the full list of species identified within the site.
	Nocturnal Spotlighting Transects	1 session per night for 7 nights between 8:00pm and 10:00pm	No, refer to Appendix B for the full list of species identified within the site.

As no evidence of either threatened small mammal species was identified as occurring within the subject land within the optimal survey period, the applicant is not required to purchase and retire any Biodiversity Offset Credits for these species.

4.4.1.3 Targeted Amphibian Survey

One threatened amphibian species, *Mixophyes balbus* (Stuttering Frog), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their presence. In order to determine the presence of these species within the subject land, targeted surveys in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 4-8** below.

Table 4-8. Amphibian targeted survey effort undertaken within the subject land

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Mixophyes balbus</i> (Stuttering Frog)	Nocturnal Call Playback	2 call playback points were established undertaken twice per night for 7 nights between approximately 8:00pm and 10:00pm	No, refer to Appendix B for the full list of species identified within the site.
	Nocturnal Spotlighting and Targeted Micro-habitat Searches	1 session per night for 7 nights between 8:00pm and 10:00pm	No, refer to Appendix B for the full list of species identified within the site.

As no evidence of Stuttering Frog was identified as occurring within the subject land within the optimal survey period, the applicant is not required to purchase and retire any Biodiversity Offset Credits for this species.

4.4.1.4 Targeted Avian Survey

One threatened avian species, *Callocephalon fimbriatum* (Gang-gang Cockatoo), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their absence. Targeted surveys were carried-out in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 4-9** below.

Table 4-9. Avian targeted survey undertaken within the subject land

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Diurnal Habitat Surveys (Area Search)	2 days in October for Gang-gang Cockatoo between 5:30am and 6:30am	No, refer to Appendix B for the full list of species identified within the site.
	Dawn Chorus Bird Call Recording	1 session per day for 2 days in October for Gang-gang Cockatoo	No, refer to Appendix B for the full list of species identified within the site.

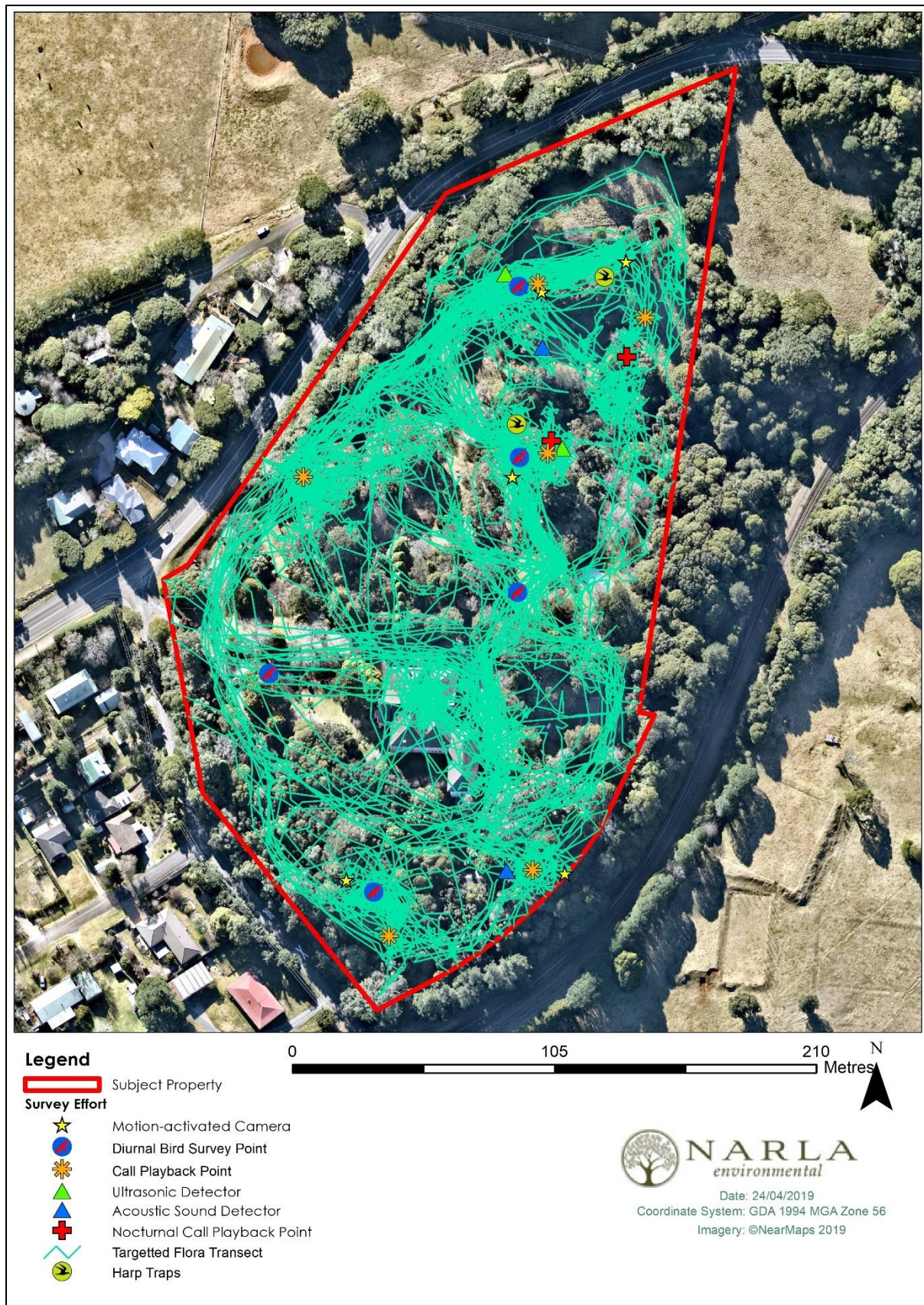


Figure 4-1. Fauna and flora species credit targeted survey effort undertaken by Narla within the subject land over the course of the study.

5 Avoid and Minimise Impacts

5.1 Impact Mitigation and Minimisation Measures

This section of the report details recommended efforts to avoid and minimise impact on biodiversity values associated with the proposed activity. Measures to be implemented before, during and post construction to avoid and minimise the impacts of the project are detailed in **Table 5-1**. The final project footprint including construction and operation is presented in **Figure 1-1**.

Considering the nature and scale of the proposed activity, the character of the study area, the historic disturbance and ongoing vegetation maintenance within the site as well as the proposed impact mitigation measures, there are unlikely to be any appreciable indirect impacts on biodiversity values arising from the proposal that have not been addressed in **Table 5-1** below. Only the direct impacts associated with vegetation clearing and construction of the proposal will require biodiversity offsets according to the BAM. The Biodiversity Offset Credit obligations required for the proposed activity are detailed in **Section 6.4** below.

Table 5-1. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project

Action	Outcome/Measure	Timing	Responsibility
Project Location	<p>The project location (1 Fountaindale Road, Robertson) is a highly modified site, which has been extensively built up and landscaped with ornamental plants. It contains extensive existing infrastructure and amenities. It occurs on the periphery of the suburb of Robertson.</p> <p>Owing to the project location, the proposal is unlikely exacerbate the fragmentation of native vegetation, or impact on any preferential fauna habitat (owing to its location in a high-traffic area).</p>	Pre-construction phase	<ul style="list-style-type: none"> Proponent Contractor
Project Design	<p>Wherever possible, the proposed development has been positioned in order to avoid and minimise the potential resulting impacts on biodiversity values (in cleared land, away from high-quality native vegetation) within the subject land:</p> <ul style="list-style-type: none"> The applicant has designed the proposal, so as to not impact on PCT 743 'Brown barrel – Mountain Grey Gum tall moist forest on basalts of the Southern highlands Bioregion and Sydney Basin Bioregion' which is a Candidate SAll. Important amphibian breeding habitat will be retained in the dams. Where possible, fragmentation of native vegetation within the site, has mostly been avoided. Connective corridors will remain between rainforest patches along the southern, eastern and western boundaries, and throughout the broader landscape. Asset Protection Zones have been modelled, so as to completely avoid impacts on the Candidate SAll (PCT 743) and where possible, avoid impacts on high-quality rainforest (PCT1129) which has been identified as SAll in NSW as it aligns with the EPBC Act critically endangered Robertson Rainforest in the Sydney Basin Bioregion TEC. The proposed development has been designed to avoid and minimise impacts on native vegetation and habitat where possible within the subject land (Figure 5-1). Where vegetation/habitat avoidance is 	Pre-construction phase	<ul style="list-style-type: none"> Proponent

Action	Outcome/Measure	Timing	Responsibility
	<p>not possible, mitigation measures have been designed and recommended to reduce impacts e.g. Nest Boxes.</p> <p>An options report detailing the measures implemented to avoid impacts to vegetation over the course of the project can be found in Appendix E</p>		
Assigning a Project Ecologist	<p>Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 3 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management.</p> <p>The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act.</p> <p>The Ecologist will be commissioned to:</p> <ul style="list-style-type: none"> Assist the applicant in identifying and assigning an appropriate skilled Bushland Restoration Professional to implement vegetation restoration; Help the applicant undertake any threatened species habitat augmentation or translocation; Undertake any required targeted searches for threatened flora prior to vegetation clearing; Undertake an extensive pre-clearing survey; delineating habitat-bearing trees and shrubs to be retained/removed; and Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced fauna. 	Prior to vegetation clearance works	<ul style="list-style-type: none"> Proponent
Appointment of Qualified Bushland Restoration Professionals	<p>Qualified bush regenerators should be contracted to undertake removal of weeds and replacement planting of locally indigenous native species.</p> <p>The Bushland Restoration Practitioner company selected to complete the project works must:</p> <ul style="list-style-type: none"> provide a statutory declaration stating their compliance with provisions of the national Gardening & Landscape Services Award 2010; provide completed and signed Subcontractor Statement regarding payment of worker's compensation, payroll tax and remuneration; provide established Workplace Health & Safety and Environmental Management Systems. Preferably the company has third-party accredited systems in place; demonstrate implementation of safe workplace and appropriate environmental management practices and procedures (e.g. appropriate transport and management of herbicides); provide Public Liability (min. \$10M) and Workers Compensation Insurance; have previous experience undertaking bushland restoration works within the Wingecarribee LGA. Contractor references are to be contacted; provide supervisor with minimum qualifications and experience including Certificate III Conservation & Land Management and two years full-time equivalent experience as a trained bush regenerator; provide a minimum of one trained bush regenerator per team of four (minimum qualifications and experience including Certificate III Conservation & Land Management and one-year full-time equivalent experience as a bush regenerator); provide a minimum of two trained bush regenerators per team of five/six (minimum qualifications and experience including Certificate III Conservation & Land Management and one-year full-time equivalent experience as a trained bush regenerator); 	<p>Prior to vegetation clearance works</p> <p>On-going post construction</p>	<ul style="list-style-type: none"> Proponent Project Ecologist

Action	Outcome/Measure	Timing	Responsibility
	<ul style="list-style-type: none"> ▪ schedule appropriately resourced regular site visits for the duration of contract period; ▪ have experience 'soft-felling' vegetation as a part of APZ management works; and ▪ all herbicide usage, including storage and transport, to be in accordance with WorkCover NSW (2006) and all relevant legislation. 		
Preparation of a Construction Environmental Management Plan (CEMP)	<p>A Construction Environmental Management Plan (CEMP) would be required for the construction phase of the project, and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity as discussed in the BDAR, the mitigation and management measures outlined within this table (Table 5-1) would be implemented as part of the CEMP for the site.</p>	Pre-construction phase	<ul style="list-style-type: none"> ▪ Proponent ▪ Project Ecologist ▪ Construction Contractor
Preparation of a Vegetation Management Plan (VMP)	<p>Owing to the presence of TECs within the subject land, a site-specific Vegetation Management Plan (VMP) has been developed that details the management of the biodiversity (particularly TEC and potential threatened species) prior, during and post demolition and construction into the future is to be commissioned and adhered to for a period of at least five (5) years post construction.</p> <p>The implementation of the corresponding VMP will ensure responsible stewardship and a minimised biodiversity impact of all future works that occur on the subject land.</p> <p>The VMP should be reviewed by a suitably qualified Ecologist, every five years from the date of inception.</p> <p>Most importantly, the VMP details:</p> <ol style="list-style-type: none"> 1. the on-going management of Robertson Rainforest (PCT1129) EEC and Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion (PCT743) CEEC within the subject land and broader subject property 2. the protection and enhancement of fauna habitat, including the replacement, of any hollows using equivalent sized nest boxes. 3. Replanting of native vegetation, where Bushfire APZ requirements allow. 	Pre-construction phase	<ul style="list-style-type: none"> ▪ Project Ecologist on behalf of Proponent
Tree Protections	<p>Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ.</p> <p>A Minor Encroachment is less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ.</p> <p>A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.</p>	Pre-construction phase	<ul style="list-style-type: none"> ▪ Proponent ▪ Arborist and fence contractor under guidance of Arboriculturalist.

Action	Outcome/Measure	Timing	Responsibility
Clearing of vegetation/ fauna habitat	<p>In preparation for the authorised clearing of native vegetation, the following conditions should be adhered to in order to minimise all potential impacts to native biodiversity values within the subject land:</p> <ul style="list-style-type: none"> before any vegetation is damaged or removed, a qualified Ecologist with flora identification experience should be assigned to undertake a pre-clearing survey to delineate areas permitted to be cleared, from areas that must be retained. Brightly coloured bunting or strong flagging tape should be used. prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience should determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the subject land due to be cleared. all trees (including dead trees) should be felled by qualified Arborists using chainsaw and pulleys only. No heavy machinery is permitted for removal of any tree. a qualified Project Ecologist with experience in handling wildlife should be present on the Project Site during all vegetation clearing in order to supervise clearing and capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals. 	Construction phase	<ul style="list-style-type: none"> Bush regeneration contractor Project Ecologist Proponent Arboricultural Professional
Relocation of woody debris	Where possible; all woody debris (fallen trees and logs), within the subject land is to be retained. Woody debris within the development footprint or prescribed APZ should be relocated, as directed by the Project Ecologist to an area of native vegetation planned for protection within the southern extent of the subject land.	Construction phase	<ul style="list-style-type: none"> Bush regeneration contractor Project Ecologist Proponent
Avoidance of hollow-bearing Trees	All hollow-bearing trees (including dead trees) should be retained where possible.	Construction phase	<ul style="list-style-type: none"> Bush regeneration contractor Project Ecologist Proponent
Salvage and relocation of hollows and/or Installation of Artificial Hollows	<p>In the event hollow-bearing trees require removal, retention and relocation of the hollow is recommended.</p> <p>The process to be undertaken should involve the soft felling of the tree at the base of the trunk so that the body of the tree remains in one single piece. The hollow bearing section of the tree can then be relocated and attached to a suitable tree in the non-APZ area of the subject property. The successful relocation of the identified habitat tree will ameliorate the loss of any hollow dwelling threatened fauna habitat features from within the proposed area of development. In the event that any existing tree hollows are damaged in the relocation process, the damaged habitat features are to be replaced with a habitat box at the compensatory ratio of 1:2.</p> <p>During any relocation or removal of habitat trees identified within the site, a Project Ecologist is to be supervising at all times.</p> <p>If relocation of the section of habitat tree cannot be achieved because of its size or structure, the applicant could explore the suitability of importing a smaller or more suitable felled hollow tree from another site and erecting that, or replacing with habitat boxes at the compensatory ratio of 1:2.</p>	Construction phase	<ul style="list-style-type: none"> Bush regeneration contractor Suitably qualified Arboriculturalist Project Ecologist Proponent

Action	Outcome/Measure	Timing	Responsibility
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	<ul style="list-style-type: none"> Proponent Construction Contractor
Erection of temporary fencing	Temporary fencing should be erected around the extent of native vegetation to be retained in order to avoid the potential of incurring indirect impacts on biodiversity values resulting from the proposed construction works.	Construction phase	<ul style="list-style-type: none"> Proponent Construction Contractor
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	<ul style="list-style-type: none"> Construction Contractors
Implementation of VMP	<p>Vegetation will be managed in accordance with the VMP (Chris & Charlotte Webb 2020) in 4 zones:</p> <ul style="list-style-type: none"> Zone 1: Existing PCT 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest Zone 2: Protection of blended native and exotic areas Zone 3: Robertson Rainforest Managed Zone 4: Existing PCT 743 Brown barrel – Mountain Grey Gum tall moist forest <p>Management will include the protecting remnant vegetation, controlling weed species and revegetation of native species.</p>	Construction phase and Post construction phase	<ul style="list-style-type: none"> Project Ecologist
Weed suppression	Weeds should be continually suppressed and prevented from re-establishing across the subject property in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase and Post-construction phase	<ul style="list-style-type: none"> Project Ecologist Bush Regeneration Contractor
Stormwater	The proposed development is unlikely to result in significant changes to storm-water runoff so it is expected there will be no exacerbated impact on native species of flora and fauna. Stormwater flow from the proposed dwellings and hard surfaces will be directed to existing paths of stormwater runoff.	Post-construction phase	<ul style="list-style-type: none"> Proponent Construction Architect

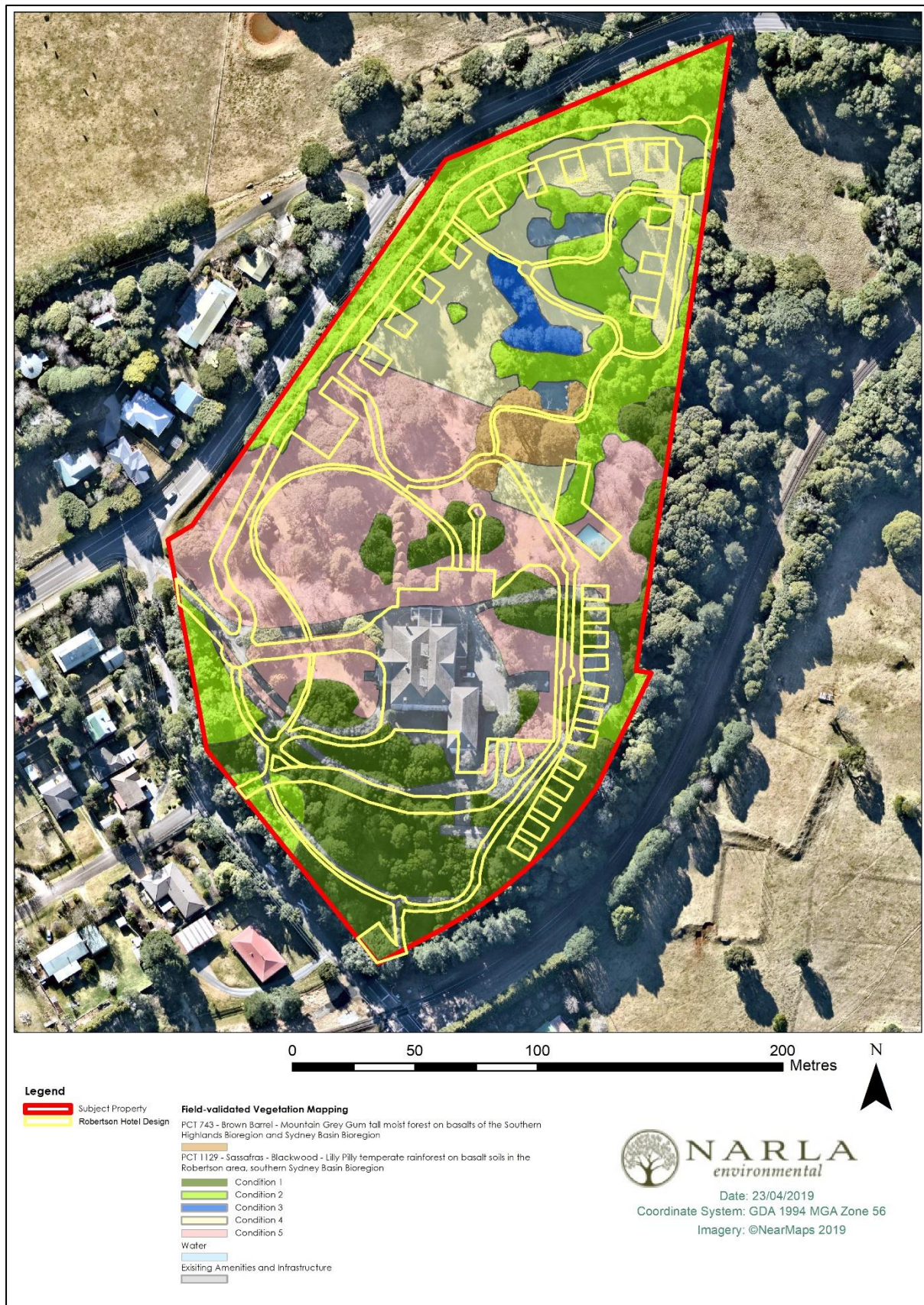


Figure 5-1. Previous Design (redesigned to avoid impacts on TEC and SAIL).

6 Impact Summary

6.1 Impacts on Biodiversity Values

6.1.1 Native Vegetation Clearance Requiring Offsetting

The following native vegetation within the subject land is proposed to be impacted as a result of the proposed development and will require the purchase and retirement of Biodiversity Offset Credits:

- 3.3 ha of native vegetation representative of PCT 1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion

6.1.2 Hollow Bearing Tree Removal

Approximately six (6) hollow-bearing trees occur within the new proposed APZ and development footprint. In the event these trees require removal, the installation of augmented tree hollows (nest boxes) is to be implemented within suitable remaining vegetation at the compensatory ratio of 1:2 (two nest boxes installed for each tree hollow removed).

6.1.3 Serious and Irreversible Impacts (SAIL)

In accordance with section 7.16 of the BC Act, a proposed development or activity that has serious and irreversible impacts (SAIL) on biodiversity values is defined as any serious and irreversible impacts on biodiversity values as determined under section 6.5 of the BC Act that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development or activity.

The consent authority must refuse to grant consent under Part 4 of the Environmental Planning and Assessment Act 1979, in the case of an application for development consent to which this Division applies (other than for State significant development), if it is of the opinion that the proposed development is likely to have serious and irreversible impacts on biodiversity values.

If the Minister for Planning is of the opinion that proposed State significant development or State significant infrastructure that is the subject of an application to which this Division applies is likely to have serious and irreversible impacts on biodiversity values, the Minister:

(a) is required to take those impacts into consideration, and

(b) is required to determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

If the determining authority is of the opinion that the proposed activity to which this Division applies is likely to have serious and irreversible impacts on biodiversity values, the determining authority:

(a) is required to take those impacts into consideration, and

(b) is required to determine whether there are any additional and appropriate measures that will minimise those impacts if the activity is to be carried out or approved.

6.1.3.1 Threatened Ecological Community SAll's

One (1) Critically Endangered Ecological Community (BC Act) present on the subject property has been identified as an 'SAll entity' (Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions) the proposal will not impacts the CEEC.

The threshold for consideration of this TEC not yet defined. This means that any impact on the potential habitat for this threatened ecological community could be considered 'serious and irreversible'. Due to the potential sensitivity of these TEC's to any impact, a determination of whether or not the proposed impacts are serious and irreversible are to be undertaken in accordance with Section 10.2.2 of the BAM (OEH 2017a): 'Additional impact assessment provisions for ecological communities.' This is outlined in **Table 6-1**.

In addition to this SAll, one (1) Endangered Ecological Community (BC Act) present on the subject land is "identified as SAll in NSW as it aligns with the EPBC Act critically endangered Robertson Rainforest in the Sydney Basin Bioregion TEC. The BAMC will display the SAll addition in early 2020" (DPIE 2020).

Table 6-1. Identification and justification for Threatened Ecological Communities considered to be at risk of Serious and Irreversible Impacts (OEH 2017c).

Threatened Ecological Community	Criteria for identifying potential entities	Justification for listing	Threshold for consideration of SAll	Present on the subject land
Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions	Principle 1 – reduction in geographic extent. Principle 2 – environmental degradation or disruption of biotic processes. Principle 3 – restricted geographic distribution.	Biodiversity Conservation Act listing status (Critically Endangered)	Not defined	Yes

Table 6-2. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact

<p style="text-align: center;">Serious and Irreversible Impact (SII)</p> <p style="text-align: center;">Impact assessment provisions for ecological communities:</p> <p style="text-align: center;">Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions</p>	
<p style="text-align: center;">BC Act Status: Critically Endangered</p>	
<p>a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SII</p>	<p>The proposed development has taken all possible measures to avoid the direct and indirect impact on Robertson Basalt Tall Open-forest. No part of the proposed development will directly affect this CEEC. Indirect impacts will be restricted to the impacts of a path bordering part of the community on site.</p>
<p>b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone</p>	<p>A total of 0.13ha of Robertson Basalt Tall Open-Forest Forest exists on the subject land. There is the potential that the proposed development may indirectly impact approximately 0.03ha of Robertson Basalt Tall Open-forest within the subject land through increased surface run-off and edge effects which may in turn lead to increased weed infestations. The vegetation within the subject land was analysed using a rapid BAM Vegetation Integrity Survey (VIS), which was calculated as having a vegetation integrity score of 45.6. This area was considered to be slightly degraded, which is consistent with its position in a weed infested area which significant historic local fragmentation. Edge effects of this community are already apparent, with high levels of weed infestations occurring within the area.</p>
<p>c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SII</p>	<p>Thresholds for ecological communities have not yet been determined by the OEH. Using the precautionary principle, it is currently assumed that the threshold for Robertson Basalt Tall Open-forest is 0ha. Given this, the proposed development will remove 0.00ha of Robertson Basalt Tall Open-forest below the threshold. Thus, this would not constitute a serious and irreversible impact as outlined in the BC Regulation 2017.</p>
<p>d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint</p>	<p>Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al, 2006) indicates the presence of 1.62 ha of Robertson Basalt Tall Open-forest within an area of 1000ha and 136.8ha within an area of 10,000ha surrounding the development footprint. Overall conditions cannot be determined for such an area without ground truthing.</p>
<p>e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration</p>	<p>Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al, 2006) mapping indicates the presence of 766.17ha of Robertson Basalt Tall-Open Forest within the 'Moss Vale' IBRA subregion. Taking into account the impact of the development on this community is 0.0ha, the remaining vegetation within the 'Moss Vale' IBRA Subregion after the proposed development will be still be 766.17ha. Overall conditions cannot be determined for such an area without ground truthing.</p>
<p>f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion</p>	<p>Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al, 2006) mapping indicates the presence of 174.43ha of the community within the NPWS reserve system in the 'Moss Vale' IBRA Subregion and 6182.74ha in Sydney Basin IBRA Region.</p>

Serious and Irreversible Impact (SII)

Impact assessment provisions for ecological communities:

Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions

BC Act Status: Critically Endangered

<p>g) the development, clearing or biodiversity certification proposal's impact on:</p>	<p>i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns</p>	<p>The proposed development may result in a slight increase in water runoff and nutrients into adjacent areas of Robertson Basalt Open-Tall Forest. However, it is unlikely that the proposed development will exacerbate abiotic factors given the location of the community in a weed infested fragmented area.</p>
	<p>ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants</p>	<p>The area of Robertson Basalt Tall- Open forest within the subject land semi-intact as it contains minimal mid storey species mixed with a weedy ground layer. The current and future fire regime for the site is beneficial to its existence as being surrounded by buildings will ensure its future protection from fire likely resulting in a more appropriate fire regime (25 years). Flood regimes have also been largely altered due to past land management practices and the surrounding residential development. It is therefore highly unlikely that the proposed development will exacerbate impacts on characteristic and functionally important species as the area is already highly altered and degraded.</p>
	<p>iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC</p>	<p>The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the abundance of invasive species within the subject land is already apparent, and the current vegetation is of low abundance. Also given the location is in a highly urbanised and fragmented area, it is highly unlikely the proposed development will significantly impact on the quality and integrity of the community within and adjacent to the subject land.</p>
<p>h) direct or indirect fragmentation and isolation of an important area of the potential TEC</p>	<p>The current network of Robertson Basalt Tall- Open forest within and adjacent to the Subject Site is located in a highly fragmented area, and is not considered a priority management site by the NSW Government Saving our Species (2019). No patch connectivity occurs out of the subject land of Robertson Basalt Tall- Open forest. It is therefore highly unlikely that the indirect impacts associated with this development will significantly impact further on the fragmentation of this community on the subject land and surrounding areas.</p>	
<p>i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.</p>	<p>NSW Government Saving our Species (2019) has identified one priority management site of Robertson Basalt Tall- Open forest within NSW.</p> <p>Various impact mitigation measures are also to be implemented before, during and post construction to avoid and minimise the impacts of the project on Robertson Basalt Tall- Open forest † (Table 5-1). No ecosystem credits are required to offset the biodiversity impacts of the proposed development.</p>	

6.2 Other Impacts

6.2.1 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the subject land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat.

Table 6-3. Indirect Impacts

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	The proposed construction may lead to enhanced weed infiltration, into adjacent habitat. This impact is likely to be restricted to the immediate area surrounding the construction footprint to a few metres.	Robertson Rainforest	Weed intensity may reduce vegetation integrity.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted to the immediate area surrounding the construction footprint to a couple of metres.	Robertson Rainforest	Edge effects may increase weed intensity and reduce vegetation integrity.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	The proposed works are unlikely to significantly exacerbate any of these issues which are all currently in effect.	NA	NA
(d) transport of weeds and pathogens from the site to adjacent vegetation	The proposed construction may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted the immediate area surrounding the development to a couple of metres. Active weed control efforts will be undertaken.	Robertson Rainforest	Edge effects may increase weed intensity and reduce vegetation integrity.
(e) increased risk of starvation, exposure and loss of shade or shelter	It is unlikely that any threatened fauna relies on habitat within the subject land, such that the proposed impacts will lead to increased risks from starvation, exposure, shade and shelter. All habitat resources removed will be replaced at a higher ratio.	NA	NA

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(f) loss of breeding habitats	<p>The proposed development may require the removal of a small number of hollow-bearing trees.</p> <p>All hollows removed to facilitate the development, will be replaced at a ratio of 1:2 elsewhere within the subject property.</p>	NA	The implementation of recommendations and mitigation measures within this document (Section 5) will result in no net loss of breeding habitat for the threatened species assumed to be present within the subject land.
(g) trampling of threatened flora species	No threatened flora species were identified within the subject land. It is not expected that any would occur that would be impacted by trampling.	NA	NA
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that these issues affect the subject land.	NA	NA
(i) fertiliser drift	This issue currently exists on the subject land. It is unlikely that the proposal would significantly increase this impact.	Robertson Rainforest & Robertson Basalt Tall Open-forest	It is not expected that fertiliser application will cause significant impacts such that the bioregional persistence of threatened species, ecological communities or their habitats could be impacted.
(j) rubbish dumping	This issue was not observed within the subject land and is not expected to be exacerbated as a result of the proposed development.	NA	NA
(k) wood collection	This issue is not likely to affect the subject land.	NA	NA
(l) bush rock removal and disturbance	This issue is not relevant to the subject land as there is no bush rock.	NA	NA
(m) increase in predatory species populations	It is unlikely that the proposed works will influence or alter predatory species populations.	NA	NA
(n) increase in pest animal populations	It is unlikely that the proposed works will influence or alter pest species populations. Pest animals are already present within the subject land.	NA	NA

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(o) increased risk of fire	<p>The proposed development is situated in bushfire prone land and has been assessed as being High risk.</p> <p>Implementation of recommendations from the corresponding bushfire report (Peterson Bushfire 2019) will mitigate any increased risk of fire.</p>	NA	NA
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	<p>The proposed development is likely to require the removal of several hollow-bearing trees.</p> <p>The development will result in the removal of one man-made waterbody in the north of the site, which provides breeding habitat for amphibians, and foraging habitat for a suite of native fauna i.e. microbats</p>	NA	The implementation of recommendations and mitigation measures within this document (Section 5) will result in no net loss of breeding habitat for the threatened species assumed to be present within the subject land.

6.2.2 Prescribed and Uncertain Impacts

This list of impacts includes all of those impacts on biodiversity values not caused by direct vegetation clearing or development that have been prescribed by the Biodiversity Conservation Regulation 2017.

Prescribed biodiversity impacts require an assessment of the impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance.

Table 6-4. Prescribed and Uncertain Impacts

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	There are no karst, caves, crevices, cliffs and other features of geological significance on or near the subject land.
Habitat of threatened species or ecological communities associated with rocks	No	There are no rocks important to threatened species or ecological communities on the subject land.
Habitat of threatened species or ecological communities associated with human made structures	No	There are no threatened species or ecological communities located within the subject land that are associated with human made structures.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	Ornamental gardens within the Subject Site may provide, intermittent, temporary foraging habitat for Grey-heralded Flying-fox when trees flower or fruit, however, this habitat is not important for the survival of this mobile species.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Yes	Habitat connectivity continues to exist along the peripheries of the subject property, which connects to a significant patch of forest to the east of the subject property. It is unlikely that the small area of impact will interrupt connectivity for any threatened fauna or flora species.
Movement of threatened species that maintains their life cycle	Yes	Habitat connectivity continues to exist along the peripheries of the subject property, which connects to a significant patch of forest to the east of the subject property. It is unlikely that the small area of impact will interrupt connectivity for any threatened fauna or flora species.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	Considering the surrounding environment, hard-surface runoff from residential development and roads would already have a large impact on the water quality of any watercourses. It is therefore unlikely that water quality will be further impacted beyond its current condition by the proposed development.
Wind turbine strikes on protected animals	No	There are no wind turbines proposed on the subject land.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	It is unlikely that vehicle strikes will be an issue given the proposed development consists of a designated, slow speed limit.

6.3 Other relevant Legislation or Planning Policies Requiring Address

6.3.1 State Environmental Planning Policy (Koala Habitat Protection) 2019

The State Environmental Planning Policy (Koala Habitat Protection) 2019 applies to all local government areas (LGAs) listed on Schedule 1 of the policy, except land dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*.

Koala Development Application Area has not been mapped within the subject land therefore an Individual Koala Plan of Management is not required.

6.3.2 Groundwater Dependent Ecosystems

The Commonwealth Groundwater Dependent Ecosystem (GDE) Policy defines GDEs as ecosystems, which have their species composition, and their natural ecological processes determined by groundwater (DLWC 2002). The Policy defines groundwater as the water beneath the earth's surface that has filtered down to the zone where the earth or rocks are fully saturated (DLWC 2002). Ecosystems vary dramatically in the degree of dependency of groundwater, from having no apparent dependence through to being entirely dependent on it (DLWC 2002). The Australian Government Atlas of Groundwater Dependent Ecosystems was used to identify any previously mapped GDEs that occur in or near the subject land. This atlas identifies GDEs reliant on surface groundwater (rivers, springs and wetlands) and subsurface groundwater (vegetation). The Atlas was reviewed and it was identified that the subject land may contain land with a low potential of containing a GDE (**Figure 6-1**).

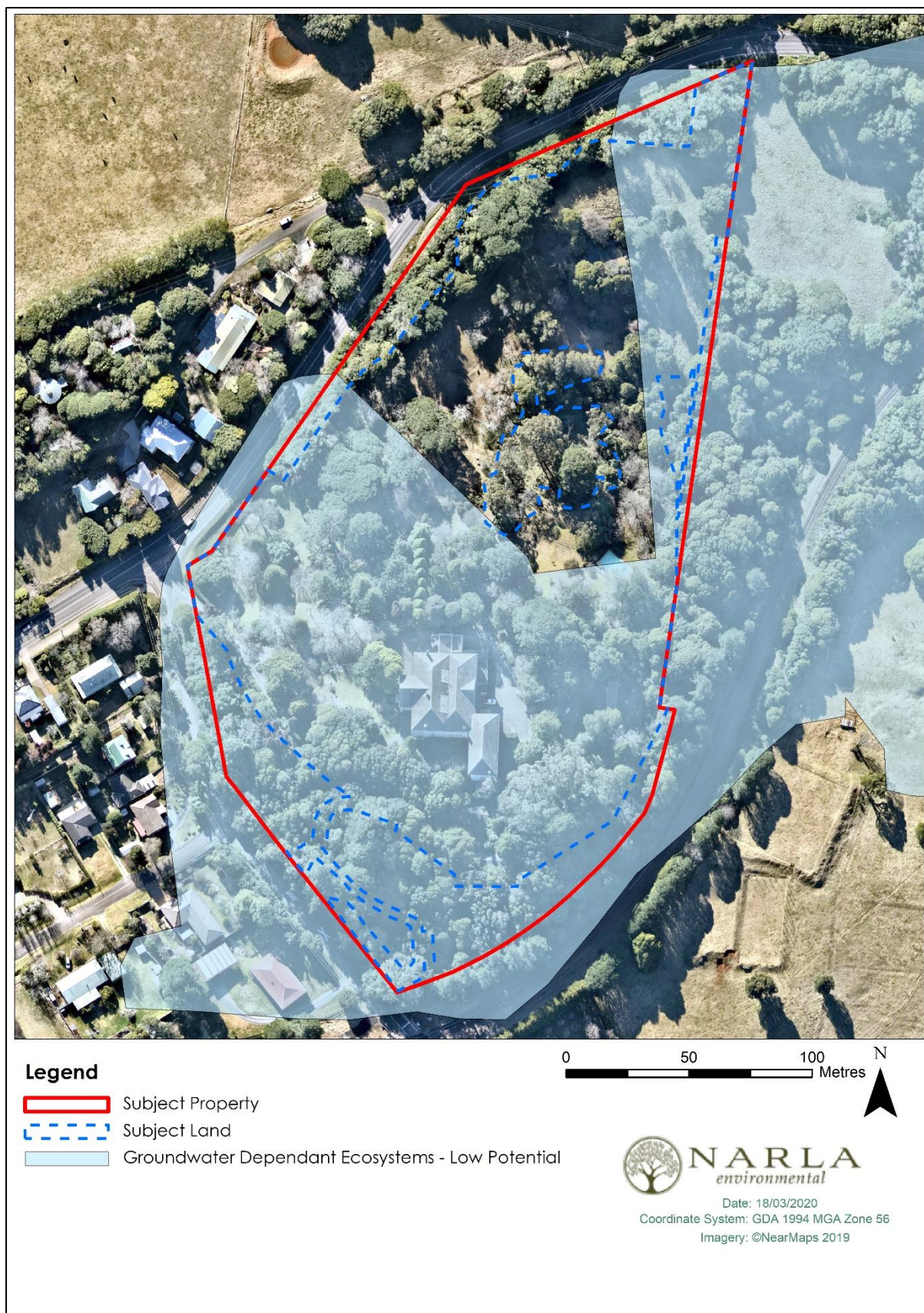


Figure 6-1. Groundwater Dependant Ecosystem Mapping (BoM 2020).

6.4 Biodiversity Offset Credit Requirements

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate Species Credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW Biodiversity Offsets Scheme (BOS) in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

6.4.1 Offset Requirement for Ecosystem Credits

A total of thirty-six (36) ecosystem credits are required to offset the biodiversity impacts of the proposed development. Estimated costs to purchase these credits, or alternatively, to allocate offset funds directly into the NSW Biodiversity Conservation Trust (BCT) are available in the NSW Biodiversity Offsets Payment Calculator (OEH 2019c). These values are presented here (**Table 6-5; Appendix C**).

Table 6-5. Ecosystem credits required to offset the proposed development

Plant Community Type (PCT)	Total Area	Threatened Ecological Community	BC Act Status	Ecosystem Credits Required
1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	3.3 ha	Robertson Rainforest in the Sydney Basin Bioregion	Endangered	36

6.4.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development.

7 Conclusion

Con Kotis c/- XPACE Design Group propose to renovate the heritage hotel, construct a new eastern hotel wing, eight two-storey eco-cabins, 12-two storey villas, leisure facilities and associated network of footpaths and roads at The Robertson Hotel, 1 Fountaindale Road, Robertson, NSW, 2577 (Lot 2, DP610676). This BDAR was prepared by Narla to identify the potential impacts of the proposal on biodiversity values within the subject land.

The proposed development is located within a bushland landscape in land zoned *E3-Environmental Management*. The proposal has been purposefully designed to minimise impacts on biodiversity values. The proposed development is expected to result in impacts to one PCT comprising removal or APZ management of 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

The biodiversity assessment and credit calculations have been performed in accordance with the BAM (OEH 2017a) and using credit calculator version 1.2.7.2 The following credits are required to be purchased retired to offset the biodiversity impacts of the proposal:

- 36 ecosystem credits to offset impacts to 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

Due to the potential sensitivity of species to any impact, a determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with Section 10.2.3 of the BAM (OEH 2017a): 'Additional impact assessment provisions for threatened species or populations.'

Mitigation measures are to be implemented to minimise potential operational impacts. These would include:

- Ongoing management of priority weeds according to statutory requirements; and
- Measures to reduce the increased risk of fire.

Considering the nature of the proposal, and the proposed impact mitigation measures proposed, there are unlikely to be any notable indirect impacts on biodiversity values arising from the proposed development. Only the direct impacts associated with vegetation clearing and construction of the dwelling will require biodiversity offsets as per the BAM.

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate credits from stewardship sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAMC (**Appendix C**). If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the BCT would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

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9 Appendices

Appendix A. Flora species identified with the subject land

Appendix B. Fauna species identified with the subject land

Appendix C. BAMC Generated Biodiversity Credit Report

Appendix D. BAM Site - Field Survey Proforma (copied directly from Electronic Data Sheet)

Appendix A. Flora species identified with the subject land

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Acacia baileyana</i>		x		
<i>Acacia melanoxylon</i>	x			
<i>Acaena novae-zelandiae</i>			x	
<i>Acer negundo*</i>		x		
<i>Acer palmatum*</i>	x			
<i>Acetosella vulgaris*</i>			x	
<i>Acmena smithii</i>			x	
<i>Adiantum aethiopicum</i>			x	
<i>Agapanthus praecox*</i>			x	
<i>Anagallis arvensis*</i>			x	
<i>Araujia sericifera*</i>			x	
<i>Asplenium flabellifolium</i>			x	
<i>Austrostipa</i> spp.			x	
<i>Backhousia myrtifolia</i>	x			
<i>Banksia ericifolia</i>		x		
<i>Banksia integrifolia</i>		x		
<i>Banksia marginata</i>		x		
<i>Betula pendula*</i>		x		
<i>Bidens pilosa*</i>			x	
<i>Blechnum cartilagineum</i>			x	
<i>Bolboschoenus</i> spp.			x	
<i>Brachychiton populneus</i>		x		
<i>Brassicaceae</i> spp.*			x	
<i>Bursaria spinosa</i>		x		
<i>Callistemon</i> spp.				
<i>Calochlaena dubia</i>			x	
<i>Carex appressa</i>			x	
<i>Carex inversa</i>			x	
<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	x			

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Casuarina glauca</i>		x		
<i>Catalpa bigonioides</i> *		x		
<i>Cedrus deodara</i> *		x		
<i>Cenchrus clandestinus</i> *			x	
<i>Centella asiatica</i> *			x	
<i>Cirsium vulgare</i> *			x	
<i>Clematis aristata</i>			x	
<i>Cononeaster coriaceus</i> *		x		
<i>Conyza bonariensis</i> *			x	
<i>Coprosma quadrifida</i>				
<i>Cryptocarya glaucescens</i>		x		
<i>Cupressus sempervirens</i> *		x		
<i>Cupressus cashmeriana</i> *		x		
<i>Cyathea australis</i>		x		
<i>Cyclospermum leptophyllum</i> *			x	
<i>Cynodon dactylon</i>			x	
<i>Cypress spp.</i> *		x		
<i>Dactylis glometata</i> *			x	
<i>Delairea odorata</i> *			x	
<i>Dendrocnide excelsa</i>	x			
<i>Desmodium rhytidophyllum</i>			x	
<i>Dichondra repens</i>			x	
<i>Dietes spp.</i>			x	
<i>Digitaria ciliaris</i> *			x	
<i>Doryphora sassafras</i>		x		
<i>Ehrharta erecta</i> *			x	
<i>Einadia nutans</i>			x	
<i>Eleocharis sphacelata</i>			x	
<i>Entolasia marginata</i>			x	
<i>Eragrostis curvula</i> *			x	

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Eragrostis leptostachya</i>			x	
<i>Eucalyptus cinerea</i>	x			
<i>Eucalyptus elata</i>	x			
<i>Eucalyptus fastigata</i>	x			
<i>Eucalyptus scoparia</i>	x			BC Act: Endangered EPBC Act: Vulnerable
<i>Euphorbia peplus*</i>			x	
<i>Eustrephus latifolius</i>			x	
<i>Fragaria spp*</i>			x	
<i>Freesia sp.</i>			x	
<i>Fumaria officinalis*</i>			x	
<i>Gamochaeta calviceps*</i>			x	
<i>Geitonoplesium cymosum*</i>			x	
<i>Genista monspessulana*</i>			x	Priority Weed & WoNS
<i>Geranium molle*</i>			x	
<i>Geranium solanderi</i>			x	
<i>Geranium spp*</i>			x	
<i>Guioa semiglauca</i>		x		
<i>Gymnostachys anceps</i>			x	
<i>Hedera helix*</i>			x	
<i>Hedychium gardnerianum*</i>			x	
<i>Hibbertia scandens</i>			x	
<i>Histiopteris incisa</i>			x	
<i>Hydrangea spp.*</i>			x	
<i>Hymenanthera dentata</i>		x		
<i>Hypericum tetrapterum*</i>			x	
<i>Hypochaeris radicata*</i>			x	
<i>Ilex aquifolium*</i>			x	
<i>Juncus acutus*</i>			x	
<i>Juncus continuus</i>			x	
<i>Juncus usitatus</i>			x	

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Lagenophora stipitata</i>			x	
<i>Ligustrum lucidum</i> *		x		Priority
<i>Ligustrum sinense</i> *		x		Priority
<i>Liquidamber styraciflua</i> *		x		
<i>Liriodendron tulipifera</i> *		x		
<i>Lycopodiella lateralis</i>			x	
<i>Lysimachia arvensis</i> *			x	
<i>Magnolia × soulangeana</i> *		x		
<i>Marsdenia rostrata</i>			x	
<i>Medicago sativa</i> *			x	
<i>Melaleuca linariifolia</i>		x		
<i>Melicytus dentatus</i>		x		
<i>Microlaena stipoides</i>			x	
<i>Modiola caroliniana</i> *			x	
<i>Myrsine howittiana</i>			x	
<i>Myrsine variabilis</i>		x		
<i>Narcissus spp.</i> *			x	
<i>Notelaea venosa</i>		x		
<i>Oplismenus spp.</i>			x	
<i>Oxalis perennans</i>			x	
<i>Pandorea pandorana</i>			x	
<i>Parsonsia spp.</i>			x	
<i>Parsonsia straminea</i>			x	
<i>Paspalum dilatatum</i> *			x	
<i>Passiflora edulis</i> *			x	
<i>Pericaria decipiens</i>			x	
<i>Photinia spp.</i> *			x	
<i>Phytolacca octandra</i> *			x	
<i>Picea sitchensis</i> *	x			
<i>Pieris japonica</i> *			x	

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Pinus radiata</i> *	x			
<i>Pittosporum eugenioides</i> *				
<i>Pittosporum multiflorum</i>		x		
<i>Pittosporum undulatum</i>		x		
<i>Plantago lanceolata</i> *			x	
<i>Platanus</i> spp.*	x			
<i>Poa annua</i> *			x	
<i>Poa sieberiana</i>			x	
<i>Potentilla indica</i> *			x	
<i>Prunella vulgaris</i> *			x	
<i>Prunus laurocerasus</i> *		x		
<i>Pteridium esculentum</i>			x	
<i>Pyrrosia rupestris</i>			x	
<i>Pyrus usseriensis</i> *		x		
<i>Rhododendron</i> spp.*			x	
<i>Ricinus communis</i> *			x	
<i>Rubus fruticosus</i> *			x	Priority Weed & WoNS
<i>Rumex</i> spp.*			x	
<i>Salix</i> spp.*	x			WoNS
<i>Senecio minimus</i>			x	
<i>Setaria parviflora</i> *			x	
<i>Smilax australis</i>			x	
<i>Solanum aviculare</i>			x	
<i>Solanum mauritianum</i> *			x	
<i>Solanum nigrum</i> *			x	
<i>Solanum prinophyllum</i>			x	
<i>Sonchus asper</i> *				
<i>Stellaria media</i> *			x	
<i>Streblus brunonianus</i>	x			
<i>Syzygium australe</i>		x		

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Syzygium luehmannii</i>			x	
<i>Taraxacum officinale</i> *			X	
<i>Thuja plicata</i> *		x		
<i>Tradescantia fluminensis</i> *			x	
<i>Trifolium dubium</i> *			x	
<i>Trifolium repens</i> *			x	
<i>Tylophora barbata</i>			x	
<i>Ulmus glabra</i> *		x		
<i>Urtica dioica</i> *			x	
<i>Urtica incisa</i>			x	
<i>Veronica plebeia</i>			x	
<i>Viola hederacea</i>			x	
<i>Wahlenbergia gracilis</i>			x	
<i>Wilkiea huegeliana</i>		x		
<i>Yucca spp.</i> *			x	
<i>Zantedeschia aethiopica</i> *			x	

* Denotes exotic species

Appendix B. Fauna species identified with the subject land

Class	Scientific Name	Common Name	Status
Amphibia	<i>Crinia signifera</i>	Common Eastern Froglet	Protected
Amphibia	<i>Limnodynastes peronii</i>	Striped Marsh Frog	Protected
Amphibia	<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	Protected
Amphibia	<i>Pseudophryne bibroni</i>	Bibron's Toadlet	Protected
Amphibia	<i>Litoria peronii</i>	Peron's Tree Frog	Protected
Amphibia	<i>Litoria verreauxii</i>	Whirring Tree Frog	Protected
Amphibia	<i>Uperoleia laevis</i>	Smooth Toadlet	Protected
Aves	<i>Acanthiza lineata</i>	Striated Thornbill	Protected
Aves	<i>Acanthiza pusilla</i>	Brown Thornbill	Protected
Aves	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	Protected
Aves	<i>Anas platyrhynchos domesticus</i> *	Mallard (Domestic Duck)	Feral Pest
Aves	<i>Anthochaera chrysoptera</i>	Little Wattlebird	Protected
Aves	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Protected
Aves	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo	Protected
Aves	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Protected
Aves	<i>Cracticus torquatus</i>	Grey Butcherbird	Protected
Aves	<i>Cracticus tibicen</i>	Australian Magpie	Protected
Aves	<i>Corvus coronoides</i>	Australian Raven	Protected
Aves	<i>Eopsaltria australis</i>	Eastern Yellow Robin	Protected
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Protected
Aves	<i>Gallus gallus</i> *	Domestic Chicken	Not Protected
Aves	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	Protected
Aves	<i>Leucosarcia melanoleuca</i>	Wonga Pigeon	Protected
Aves	<i>Macropygia phasianella</i>	Brown Cuckoo Dove	Protected
Aves	<i>Meliphaga lewinii</i>	Lewin's Honeyeater	Protected
Aves	<i>Microeca fascians</i>	Jacky Winter	Protected
Aves	<i>Neochmia temporalis</i>	Red-browed Finch	Protected
Aves	<i>Pachycephala pectoralis</i>	Australian Golden Whistler	Protected
Aves	<i>Pardalotus punctatus</i>	Spotted Pardalote	Protected
Aves	<i>Petroica rosea</i>	Rose Robin	Protected
Aves	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Protected
Aves	<i>Platycercus elegans</i>	Crimson Rosella	Protected
Aves	<i>Psophodes olivaceus</i>	Eastern Whipbird	Protected
Aves	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	Protected
Aves	<i>Rhipidura albiscapa</i>	Grey Fantail	Protected
Aves	<i>Rhipidura rufifrons</i>	Rufous Fantail	Migratory
Aves	<i>Sericornis frontalis</i>	White-browed Scrub-Wren	Protected
Aves	<i>Sericornis magnirostra</i>	Large-billed Scrubwren	Protected
Aves	<i>Strepera graculina</i>	Pied Currawong	Protected

Class	Scientific Name	Common Name	Status
Aves	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	Protected
Aves	<i>Turdus merula</i> *	Common Blackbird	Feral Pest
Aves	<i>Zoothera lunulata</i>	Bassian Thrush	Protected
Aves	<i>Zosterops lateralis</i>	Silvereye	Protected
Mammalia	<i>Australomys australis</i>	White-striped freetail Bat	Protected
Mammalia	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	Protected
Mammalia	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	Protected
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle (Possible)	Vulnerable
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Definite)	Vulnerable
Mammalia	<i>Mormopterus norfolkensis</i>	Eastcoast Freetail Bat (Possible)	Vulnerable
Mammalia	<i>Nyctophilus spp.</i>	Long-eared Bat	Protected
Mammalia	<i>Oryctolagus cuniculus</i> *	European Rabbit	Feral Pest
Mammalia	<i>Ozimops ridei</i>	Eastern Freetail Bat	Protected
Mammalia	<i>Petaurus breviceps</i>	Sugar Glider	Protected
Mammalia	<i>Pseudocheirus peregrinus</i>	Ring-tailed Possum	Protected
Mammalia	<i>Rattus fuscipes</i>	Bush Rat	Protected
Mammalia	<i>Rattus rattus</i> *	Black Rat	Feral Pest
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat (Possible)	Vulnerable
Mammalia	<i>Scotepens orion</i>	Eastern Broad Nosed Bat (Possible)	Vulnerable
Mammalia	<i>Trichosurus vulpecula</i>	Common Brushtail Possum	Protected
Mammalia	<i>Vespadelus darlingtoni</i>	Large Forest Bat	Protected
Mammalia	<i>Vombatus ursinus</i>	Common Wombat	Protected
Reptilia	<i>Austrelaps superbis</i>	Lowland Copperhead	Protected
Reptilia	<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	Protected
Reptilia	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	Protected
Reptilia	<i>Trachemys scripta elegans</i> *	Red-eared Slider Turtle	Feral Pest

* Denotes exotic species

Appendix C. BAMC Generated Biodiversity Credit Report



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019576/BAAS19040/20/00019579	Robertson Hotel	26/11/2019
Assessor Name	Assessor Number	BAM Data version *
		22
Proponent Names	Report Created	BAM Case Status
Con Kotis	19/03/2020	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	19/03/2020

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

Potential Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Assessment Id	Proposal Name
00019576/BAAS19040/20/00019579	Robertson Hotel

Page 1 of 3

BAM Biodiversity Credit Report (Like for like)

Predicted Threatened Species Not On Site
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1129-Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	Robertson Rainforest in the Sydney Basin Bioregion	3.3	36.00

1129-Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	Like-for-like credit retirement options			
	Name of offset trading group	Trading group	HBT	IBRA region
	Robertson Rainforest in the Sydney Basin Bioregion This includes PCT's: 1128, 1129	-	Yes	Moss Vale, Burragorang, Ettrema, Illawarra and Sydney Cataract. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Assessment Id	Proposal Name	Page 2 of 3
00019576/BAAS19040/20/00019579	Robertson Hotel	



BAM Biodiversity Credit Report (Like for like)

No Species Credit Data

Assessment Id

00019576/BAAS19040/20/00019579

Proposal Name

Robertson Hotel

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Appendix D. BAM Site - Field Survey Proforma (copied directly from Electronic Data Sheet)

BAM Site – Field Survey Form					
Date:	21-Mar-2019	Plot ID:	Condition 1 (Remnant)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.59038900
Datum:	GDA94	Middle bearing from 0m:	106° E	Longitude:	150.61030800
PCT:	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				

[illegible]

BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	2	11
30-49cm	present	0
20-29cm	present	0
10-19cm	present	0
5-9cm	present	0
<5cm	present	0

Length of Logs (m)	26
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BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	0
2 (15m)	0
3 (25m)	0
4 (35m)	0
5 (45m)	50
Average	10

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	3	110
Shrub	7	3.8
Grass	0	0
Forb	1	0.3
Fern	1	0.2
Other	7	5.6
High Threat Exotics	4	110.2

* Denotes Exotic Species

BAM Site – Field Survey Form					
Date:	21-Mar-2019	Plot ID:	Condition 2 (Regrowth)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.58856800
Datum:	GDA94	Middle bearing from 0m:	139° SE	Longitude:	150.61141100
PCT:	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	<i>Cryptocarya glaucescens</i>	2.5	3
Other (OG)	<i>Cyathea</i> spp.	5	N/A
HTE	<i>Hedera helix</i>	42	N/A
Tree (TG)	<i>Doryphora sassafras</i>	5	N/A
Shrub (SG)	<i>Pittosporum undulatum</i>	10	N/A
Tree (TG)	<i>Acmena smithii</i>	3	2
Shrub (SG)	<i>Alectryon suncinereus</i>	0.5	1
Shrub (SG)	<i>Melicytus dentatus</i>	0.5	14
Tree (TG)	<i>Acacia melanoxylon</i>	40	N/A
Shrub (SG)	<i>Wilkiea huegeliana</i>	0.5	0
Other (OG)	<i>Hibbertia scandens</i>	2	3
#N/A	<i>Platanus</i> spp.	0.5	2
#N/A	<i>Zantedeschia aethiopica</i>	0.1	1
Fern (EG)	<i>Pyrrosia rupestris</i>	0.1	14
HTE	<i>Rubus fruticosus</i>	0.1	8
Shrub (SG)	<i>Coprosma quadrifida</i>	0.1	2
#N/A	<i>Geranium molle</i>	0.1	10
Shrub (SG)	<i>Pittosporum multiflorum</i>	0.1	1
HTE	<i>Ehrharta erecta</i>	0.1	15
Grass & grasslike (GG)	<i>Microlaena stipoides</i>	2	150
Grass & grasslike (GG)	<i>Entolasia marginata</i>	6.5	N/A
Forb (FG)	<i>Senecio minimus</i>	0.5	6
Other (OG)	<i>Pandorea pandorana</i>	30	N/A
Grass & grasslike (GG)	<i>Carex appressa</i>	1	10
HTE	<i>Tradescantia fluminensis</i>	25	N/A
Other (OG)	<i>Marsdenia rostrata</i>	0.1	2
#N/A	<i>Ilex aquifolium</i>	0.1	3
Tree (TG)	<i>Dendrocnide excelsa</i>	5	1
Other (OG)	<i>Smilax australis</i>	0.1	1
Forb (FG)	<i>Solanum prinophyllum</i>	0.1	3
Forb (FG)	<i>Centella asiatica</i>	0.1	20
HTE	<i>Ligustrum sinense</i>	0.1	5

BAM Site – Field Survey Form			
Other (OG)	Geitonoplesium cymosum	0.1	3
Forb (FG)	Viola spp.	0.1	20
Forb (FG)	Acaena novae-zelandiae	0.1	10
Grass & grasslike (GG)	Juncus continuus	0.1	1
Other (OG)	Parsonsia straminea	0.1	1
Shrub (SG)	Myrsine howittiana	0.1	2
#N/A	Phytolacca octandra	0.1	2
Shrub (SG)	Solanum aviculare	0.1	3
Other (OG)	Tylophora barbata	0.1	1
Forb (FG)	Oxalis spp.	0.1	15
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	1	0	
50-79cm	absent	NA	
30-49cm	present	0	
20-29cm	present	0	
10-19cm	present	0	
5-9cm	present	0	
<5cm	present	0	

Length of Logs (m)	0
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BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	5
2 (15m)	10
3 (25m)	75
4 (35m)	80
5 (45m)	50
Average	44

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	5	55.5
Shrub	8	11.9
Grass	4	9.6
Forb	6	1
Fern	1	0.1
Other	8	37.5
Hight Threat Exotics	5	67.3

BAM Site – Field Survey Form					
Date:	21-Mar-2019	Plot ID:	Condition 3 (Modified)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.58822600
Datum:	GDA94	Middle bearing from 0m:	125° SE	Longitude:	150.61089600
PCT:	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	Casuarina cunninghamiana subsp. cunninghamiana	40	N/A
Tree (TG)	Eucalyptus cinerea	0.5	1
#N/A	Platanus spp.	0.2	21
#N/A	Melaleuca linearifolius	1	1
Forb (FG)	Persicaria decipiens	0.1	5
#N/A	Geranium molle	35	N/A
HTE	Rubus fruticosus	0.5	3
Forb (FG)	Acaena novae-zelandiae	0.5	30
Tree (TG)	Eucalyptus spp.	0.5	1
#N/A	Conyza bonariensis	0.1	16
#N/A	Phytolacca octandra	0.1	7
Shrub (SG)	Solanum aviculare	0.5	7
#N/A	Potentilla indica	0.1	4
Shrub (SG)	Melicytus dentatus	0.1	7
#N/A	Hypericum tetrapterum	0.1	2
#N/A	Cirsium vulgare	0.1	2
Other (OG)	Hibbertia scandens	0.1	5
Fern (EG)	Adiantum aethiopicum	0.1	30
Forb (FG)	Senecio minimus	0.5	25
Forb (FG)	Oxalis spp.	18	N/A
Grass & grasslike (GG)	Microlaena stipoides	10	N/A
Other (OG)	Calochlaena dubia	0.1	2
Forb (FG)	Centella asiatica	0.1	50
Forb (FG)	Veronica plebeia	0.1	5
#N/A	Gamochaeta calviceps	0.1	1
#N/A	Bidens pilosa	0.1	1
Forb (FG)	Solanum prinophyllum	0.1	5
#N/A	Modiola caroliniana	0.3	25
Fern (EG)	Pyrrosia rupestris	0.1	1
Grass & grasslike (GG)	Carex appressa	0.1	1
#N/A	Hypochaeris radicata	0.1	1
#N/A	Lysimachia arvensis	0.1	5

BAM Site – Field Survey Form			
Forb (FG)	Einadia nutans	0.1	4
#N/A	Trifolium dubium	0.1	1
HTE	Ehrharta erecta	5	N/A
#N/A	Poa annua	0.1	2
Other (OG)	Clematis aristata	0.1	1
Other (OG)	Geitonoplesium cymosum	0.1	1
Other (OG)	Parsonsia straminea	0.1	1
#N/A	Trifolium repens	0.1	1
#N/A	Brassicaceae spp.	0.2	30
HTE	Acetosella vulgaris	0.1	10
Shrub (SG)	Callistemon spp.	0.1	0
#N/A	Solanum nigrum	0.1	1
#N/A	Euphorbia peplus	0.1	5
Grass & grasslike (GG)	Entolasia spp.	0.1	5
Grass & grasslike (GG)	Eragrostis leptostachya	0.1	3
#N/A	Taraxacum officinale	0.1	1
#N/A	Prunella vulgaris	0.1	3
#N/A	Stellaria media	0.1	1
#N/A	Sonchus asper	0.1	1
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	absent	NA	
50-79cm	absent	NA	
30-49cm	present	0	
20-29cm	present	0	
10-19cm	present	0	
5-9cm	present	0	
<5cm	present	0	
Length of Logs (m)	5		

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	5
2 (15m)	75
3 (25m)	0
4 (35m)	0
5 (45m)	10
Average	18

BAM Site – Field Survey Form		
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	3	41
Shrub	3	0.7
Grass	4	10.3
Forb	8	19.5
Fern	2	0.2
Other	5	0.5
Hight Threat Exotics	3	5.6

BAM Site – Field Survey Form					
Date:	22-Mar-2019	Plot ID:	Condition 1 (Basalt Woodland)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.58879300
Datum:	GDA94	Middle bearing from 0m:	170° S	Longitude:	150.61116100
PCT:	PCT743 'Brown barrel – Mountain Grey Gum tall moist forest on basalts of the Southern highlands Bioregion and Sydney Basin Bioregion'				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	Eucalyptus scoparia	0.1	0
Tree (TG)	Eucalyptus cinerea	0.1	0
HTE	Pinus radiata	25	N/A
Shrub (SG)	Pittosporum undulatum	3.5	20
Shrub (SG)	Wilkiea huegeliana	0.1	1
Tree (TG)	Eucalyptus elata	40	N/A
Shrub (SG)	Myrsine howittiana	0.1	3
Shrub (SG)	Melicytus dentatus	1	26
HTE	Ligustrum sinense	0.1	2
Other (OG)	Cyathea leichhardtiana	0.1	0
Shrub (SG)	Solanum aviculare	1	5
#N/A	Phytolacca octandra	0.1	4
Grass & grasslike (GG)	Carex appressa	2.5	28
Other (OG)	Geitonoplesium cymosum	0.1	2
Grass & grasslike (GG)	Juncus usitatus	0.2	6
Forb (FG)	Urtica incisa	0.1	30
#N/A	Hypochaeris radicata	0.1	2
Fern (EG)	Pyrrosia rupestris	0.1	2
Forb (FG)	Dichondra repens	0.1	20
Grass & grasslike (GG)	Microlaena stipoides	70	N/A
Grass & grasslike (GG)	Entolasia marginata	10	N/A
Tree (TG)	Acacia melanoxylon	0.1	3
Forb (FG)	Senecio minimus	1.5	23
#N/A	Geranium molle	0.2	50
Other (OG)	Clematis aristata	0.1	1
Forb (FG)	Viola hederacea	0.2	200
Forb (FG)	Solanum prinophyllum	0.1	10
Other (OG)	Pandorea pandorana	0.1	4
HTE	Rubus fruticosus	0.1	4
#REF!	Ehrharta erecta	0.1	10
Other (OG)	Hibbertia scandens	0.5	4
Other (OG)	Parsonsia straminea	0.1	3
#N/A	Taraxacum officinale	0.1	1

BAM Site – Field Survey Form			
#N/A	Euphorbia peplus	0.1	1
HTE	Acetosella vulgaris	0.1	10
Forb (FG)	Hypericum gramineum	0.1	20
#N/A	Ilex aquifolium	0.1	1
#N/A	Acer palmatum	0.1	3
Grass & grasslike (GG)	Bolboschoenus spp.	0.1	1
#N/A	Setaria parviflora	0.1	2
Forb (FG)	Acaena novae-zelandiae	0.1	20
#N/A	Bidens spp.	0.1	1
Forb (FG)	Wahlenbergia gracilis	0.1	1
Other (OG)	Calochlaena dubia	0.1	1
#N/A	Dactylis glometata	0.1	1
Forb (FG)	Oxalis spp.	0.1	5
Other (OG)	Smilax australis	0.1	1
Grass & grasslike (GG)	Poa sieberiana	0.1	5
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	1	1	
50-79cm	absent	NA	
30-49cm	absent	NA	
20-29cm	absent	NA	
10-19cm	absent	NA	
5-9cm	absent	NA	
<5cm	present	0	

Length of Logs (m)	5
--------------------	---

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	10
2 (15m)	40
3 (25m)	0
4 (35m)	0
5 (45m)	0
Average	10

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	4	40.3
Shrub	5	5.7
Grass	6	82.9
Forb	9	2.4
Fern	1	0.1
Other	8	1.2

BAM Site – Field Survey Form		
Hight Threat Exotics	4	25.3

BAM Site – Field Survey Form					
Date:	22-Mar-2019	Plot ID:	Condition 4 (Grassland)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.58807200
Datum:	GDA94	Middle bearing from 0m:	173° S	Longitude:	150.61173000
PCT:	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				

Growth Form	Scientific Name	Cover	Abundance
HTE	Pinus radiata	2	2
Grass & grasslike (GG)	Entolasia marginata	28	N/A
#N/A	Geranium molle	0.1	50
#N/A	Hypochaeris radicata	0.2	30
#N/A	Plantago lanceolata	0.2	30
Fern (EG)	Pteridium esculentum	1	25
HTE	Eragrostis curvula	0.1	4
#N/A	Brassicaceae spp.	0.1	4
HTE	Acetosella vulgaris	0.1	20
Forb (FG)	Oxalis spp.	0.1	10
Fern (EG)	Lycopodiella lateralis	0.1	200
#N/A	Prunella vulgaris	0.1	10
#N/A	Dactylis glomerata	0.1	20
#N/A	Taraxacum officinale	0.1	2
HTE	Paspalum dilatatum	0.1	30
#N/A	Freesia spp.	0.5	30
Other (OG)	Smilax australis	0.1	1
Grass & grasslike (GG)	Austrostipa spp.	0.1	40
#N/A	Medicago sativa	0.1	40
Other (OG)	Pandorea pandorana	0.1	3
Forb (FG)	Acaena novae-zelandiae	0.1	6
Shrub (SG)	Myrsine howittiana	0.1	2
Grass & grasslike (GG)	Poa sieberiana	0.5	40
Grass & grasslike (GG)	Microlaena stipoides	28	N/A
Forb (FG)	Desmodium rhytidophyllum	0.1	50
HTE	Rubus fruticosus	0.2	6

BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	absent	NA
50-79cm	absent	NA
30-49cm	absent	NA
20-29cm	absent	NA
10-19cm	present	0
5-9cm	absent	NA
<5cm	absent	NA

Length of Logs (m)	0
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BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	0
2 (15m)	0
3 (25m)	0
4 (35m)	0
5 (45m)	5
Average	1

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	0	0
Shrub	1	0.1
Grass	4	56.6
Forb	3	0.3
Fern	2	1.1
Other	2	0.2
Hight Threat Exotics	5	2.5

BAM Site – Field Survey Form					
Date:	29-Mar-2019	Plot ID:	Condition 5 (Manicured Gardens)	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Latitude:	-34.588925
Datum:	GDA94	Middle bearing from 0m:	66° NE	Longitude:	150.61013
PCT:	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				

Growth Form	Scientific Name	Cover	Abundance
#N/A	Betula pendula	3	1
HTE	Pinus radiata	40	N/A
#N/A	Picea sitchensis	5	N/A
#N/A	Acer spp.	20	N/A
#N/A	Cononeaster coriaceus	5	N/A
Shrub (SG)	Pittosporum spp.	1	1
Other (OG)	Parsonsia straminea	0.1	10
Grass & grasslike (GG)	Microlaena stipoides	2	400
Forb (FG)	Centella asiatica	0.01	250
HTE	Ehrharta erecta	3	250
Forb (FG)	Viola hederacea	0.1	250
Fern (EG)	Asplenium flabellifolium	0.1	15
HTE	Ligustrum sinense	0.1	20
#N/A	Geranium molle	3	200
#N/A	Sonchus asper	0.15	50
Shrub (SG)	Solanum aviculare	1	5
Other (OG)	Pandorea pandorana	1	5
Other (OG)	Eustrephus latifolius	0.1	20
Tree (TG)	Doryphora sassafras	0.1	1
HTE	Araujia sericifera	1	5
HTE	Rubus fruticosus	0.15	15
Forb (FG)	Dichondra repens	2	300
HTE	Tradescantia fluminensis	5	N/A
Forb (FG)	Oxalis spp.	1	200
HTE	Paspalum dilatatum	3	200
#N/A	Hypochaeris radicata	0.1	10
#N/A	Geranium spp.	0.01	10
Shrub (SG)	Bursaria spinosa	1	15
Shrub (SG)	Acacia spp.	0.01	1
Other (OG)	Parsonsia straminea	0.1	10
HTE	Hedera helix	0.1	10
Fern (EG)	Pyrrosia rupestris	0.05	10
Other (OG)	Cyathea spp.	0.12	4

BAM Site – Field Survey Form			
Grass & grasslike (GG)	Cynodon dactylon	1	300
#N/A	Setaria parviflora	0.01	50
Grass & grasslike (GG)	Entolasia marginata	0.1	50
#N/A	Digitaria ciliaris	0.05	50
Grass & grasslike (GG)	Eragrostis leptostachya	2	400
#N/A	Hydrangea spp.	15	N/A
#N/A	Medicago spp.	0.01	10
Forb (FG)	Rumex spp.	0.01	10
Forb (FG)	Einadia nutans	0.01	10
Forb (FG)	Solanum prinophyllum	0.01	1
Grass & grasslike (GG)	Carex appressa	0.5	150
#N/A	Phytolacca octandra	0.5	3
Shrub (SG)	Pittosporum undulatum	0.02	1
Shrub (SG)	Melicytus dentatus	0.2	5
#N/A	Catalpa bigoniodes	15	N/A
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	0	0	
50-79cm	0	0	
30-49cm	absent	0	
20-29cm	absent	0	
10-19cm	absent	0	
5-9cm	absent	0	
<5cm	present	0	

Length of Logs (m)	1
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BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	20
2 (15m)	60
3 (25m)	3
4 (35m)	60
5 (45m)	5
Average	29.6

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	1	0.1
Shrub	6	3.23
Grass	5	5.6
Forb	7	3.14
Fern	2	0.15
Other	5	1.42

BAM Site – Field Survey Form		
Hight Threat Exotics	8	52.35

Appendix E. Robertson Hotel Options Report (GSA 2020)

DESIGN OPTIONS REPORT

Proposed Redevelopment of The Robertson Hotel

**No. 1 Fountaindale Road,
Robertson**

Prepared for:

Mr Con Kotis

C/- X.Pace Design

201/50 Marshall Street

Surry Hills 2010

Prepared by:

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JOB NO. 18274

January 2020

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Job No: 18274

Revision No: 1

Report prepared by: **H Rubenstein**
Senior Planner

Report reviewed by:



George Karavanas
Director

Date: January 2020

For and on behalf of: **GSA Planning**
95 Paddington Street
PADDINGTON NSW 2021

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1.0 INTRODUCTION

This Design Options Report has been prepared for Mr Con Kotis by Gary Shiels & Associates Pty Ltd – (hereafter referred to as GSA Planning), in consultation with X.Pace Design. GSA Planning has expertise in Urban Design, Environmental & Traffic Planning.

This report is to accompany a development application to Wingecarribee Council for the redevelopment of The Robertson Hotel at No. 1 Fountaindale Road, Robertson. This report is also supplementary to the Statement of Environmental Effects prepared by GSA, which forms part of the development application submission.

The purpose of this report is to outline the design options that were considered at the design development stage. It also details how the preferred masterplan design option evolved, as it was informed by the various environmental constraints that are particular to the subject site.

The site is zoned E3 Environmental Management under the Wingecarribee Local Environmental Plan (LEP) and contains numerous heritage, bushfire, environmental and ecological constraints. The proposed design has been undertaken in consultation with specialists in these fields. Accordingly, bushfire, ecological/environmental, traffic, and heritage reports have been prepared and accompany the development application submission.

This document is divided into four sections. Section 2 includes a brief background and design objectives for redevelopment; Section 3 provides an overall outline of the proposal and includes a discussion on the design options; and Section 4 concludes the report.

2.0 BACKGROUND AND DESIGN OBJECTIVES FOR REDEVELOPMENT

This section provides a brief background to the existing site and operational constraints, and includes a project brief and design objectives.

2.1 Background

The site has operated under various owners since construction of the hotel was completed in 1924. While well-known in the local and wider area, the hotel has not been able to function to its full potential due to a number of financial and operational constraints. The current owner of the site has made the following observations which have had an adverse effect on the success of the hotel:

- Deterioration of the facilities due to age and little work being undertaken by previous owners, resulting in parts of the hotel being in a state of disrepair;
- The hotel has limited amenities to meet the expectations of a more diverse market in the 21st Century. For example, ensuites in each hotel room, in addition to other services such as TV, internet and heating/cooling are now expected by visitors as standard features, which the hotel does not fully provide;
- The hotel offers limited accommodation options which do not cater to larger family groups who may prefer self-contained accommodation;
- The hotel is popular on weekends, but severely underutilised during the week. The hotel is therefore closed between Sunday and Thursday as it is not financially viable to provide support staff when occupancy is low or zero.
- Public access to the gardens and areas of significant heritage and ecological value is limited due to these areas being fenced off.

2.2 Project Brief/Design Objectives

To ensure long term financial success while maintaining the historic significance of the hotel, the current owner approached X.Pace Design with a view to redevelop the site to make the hotel more attractive and relevant to a wider market as well as meet current visitor expectations. As works to the existing hotel would require its closure for an extended period, construction of the new facilities would enable the hotel to continue operating. The project included the following design objectives:

- An upgrade of the existing hotel facility, including an increase in hotel rooms, improved internal access, recreational spaces and conference facilities;
- Provision of a broader range of accommodation types that are flexible in design so they can be reconfigured for a multitude of groups (ranging from corporate visitors, singles to large families);
- Provision of more outdoor recreation facilities to be managed by the hotel;
- Opening up outdoor facilities for public use, by arrangement with the hotel;
- Promotion of local art and culture;
- Creation of new pathways to activate the unbuilt heritage environment and provide greater access to the landscaped areas of high heritage and ecological value;
- Consider the various environmental and ecological constraints of the site in any future design.

The intended design concept is one that is to resemble a village centre containing multiple hotel and function services and facilities that will attract a broader range of local and international visitors, provide employment opportunities and positively contribute to the economy of Robertson.

3.0 PROPOSAL AND DESIGN OPTIONS

The following sections outline the existing site, the proposal and the evolution of design options, which were informed by the various environmental/ecological site constraints.

3.1 The Subject Site

The site is occupied by a part three and part four storey hotel containing 49 rooms. A single storey worker's cottage is located adjacent to the hotel, with both structures located within the southern portion of the site and set back from the site boundaries. The site is accessed from a driveway located at the corner of Fountaindale Road and Illawarra Highway. Pedestrian and vehicular pathways within the southern portion of the site lead to the hotel entrance and cottage, and extend around the hotel to the rear of the building where on-grade parking is provided.

A swimming pool is located on the eastern side of the site. A pond and dam are located within the northern portion of the site and there is substantial vegetation throughout, which is largely fenced off from the hotel (see Figure 1).



Source: X.Pace Design

Figure 1: Existing Site Plan

3.2 The Proposal

The proposed works, designed by X.Pace Design include the refurbishment of the existing hotel, a three storey addition to the rear of the hotel and function centre to accommodate new rooms, and new basement car parking. The proposal also includes new eco-tourist facilities in the form of cabins and villas with car parking, all to be managed by the hotel. In addition, the proposal will include recreational facilities in the form of a new swimming pool and leisure centre, refurbishment of the worker's cottage into an artist studio, a new reception, as well as new internal roads and pedestrian pathways.

3.3 Design Options

A number of options were considered by the owner and architect as part of the design stage for the hotel redevelopment.

Given the historic significance of the site and the level of public interest in the locality, demolition of the existing building and reconstruction of a new hotel was rejected outright. However earlier options involving renovation and/or extension to the existing hotel were considered and are discussed below.

Option 1: Refurbishment of the Existing Hotel

A refurbishment of the hotel only was considered as Option 1. While an upgrade of the existing hotel room facilities is required in order to meet current market expectations, the client considered that this options would not be suitable for a number of reasons. Firstly, the hotel would need to close for an extended period of time for works to be completed, thereby losing the weekend income it currently generates. Even if staged works were considered, it would not be ideal as refurbishment works would interfere with visitor comfort and would not be economically viable.

Secondly, refurbishment of the existing hotel is limited to rooms with fixed sizes and orientations. This would not accommodate broader range of accommodation options the client wants to offer, which was a key factor in the project brief. Thirdly, it did not provide the opportunity to open up the grounds within the northern part of the site to promote the landscaping heritage of the area, which is currently fenced off from the public. Accordingly, Option 1 was not pursued.

Option 2: Extension of the Existing Hotel

A contemporary extension of the existing building to a height of six storeys was considered as Option 2. This option would have enabled the owner to provide the desired number of beds and wider range of accommodation types close to the existing hotel. However, this option was dismissed, as a six storey structure would be an inappropriate built form for the locality and would have negative impacts from a heritage perspective. In addition, a single additional structure would not provide visitors with the opportunity to enjoy the environmental qualities of the site. Accordingly, Option 2 was not pursued.

Option 3: New Hotel Adjacent to the Existing Hotel

Option 3 included the provision of a new contemporary hotel to the north, which would include a broad range of accommodation types within proximity of the existing building. This option was not pursued as there were concerns about it intruding into the Tall Rainforest areas identified on the site.

Option 4: Extension of the Existing Hotel and Provision of Eco-Cabins, Eco-Villas and Ancillary Services

The owner wished to pursue Option 4, which allowed for refurbishment and sensitive extension of the existing hotel as well as the provision of modest sized eco-cabins and villas that are spread throughout the site. This design approach enabled the heritage significance of the existing hotel to remain the primary element on the site, with new built forms designed to be subservient. It also provided the range of accommodation types within a landscaped setting, as envisaged by the owner. In addition, the hotel could continue operating independently while the cabins and villas are constructed, and once completed, these structures could operate and provide revenue while the hotel itself is being refurbished/extended. An outline of how this design option evolved will be discussed in Section 3.4.

3.4 Preferred Design (Option 4) and Evolution of the Proposal

This section outlines the preferred design option for the hotel redevelopment and how it evolved into the proposal that forms the basis of the current development application.

3.4.1 Masterplan Option A

Option A was presented as the preliminary design scheme to the client, prior to any formal or informal discussions with Council (see Figure 2). This option included the following elements:

- Alterations and additions to the existing hotel and an increase in the number of rooms from 49 to 60;
- Refurbishment of the existing worker's cottage into a new artist studio;
- A new three storey hotel wing with 46 rooms, to the rear of the existing hotel;
- Construction of 12 eco tourist cabins on the eastern side of the site;
- Construction of 12 eco villas on the eastern, northern and western sides of the site;
- Basement car parking below the hotel;
- New helipad;
- A new spa and pool area that is ancillary to the hotel, but can be made available to local organisations by arrangement;
- New internal roads and pathways to access the new accommodation as well as the existing landscape features that are currently fenced off from the public



Source: X.Pace Design

Figure 2: Design Option A

Comment

There are numerous advantages to this option. Firstly, the new additions to the hotel, eco-cabins, villas and other improvements are located away from the heritage listed hotel, which will enable the heritage listed hotel to visually remain the most significant element on the site, and this was supported in a pre-DA Heritage Impact Assessment. Secondly, the provision of the cabins and villas will improve the variety of accommodation available on the site without having an adverse effect on the operation of the hotel. Thirdly, the provision of more formalised parking will be an improvement when compared to the existing situation, where during peak periods such as weddings and conferences, overflow parking may occur on an 'ad-hoc' basis. Fourthly, the proposed swimming pool and spa will improve on the existing site facilities and are more centrally located and easily accessed from the various accommodation types.

Finally, the new vehicular and pedestrian pathways will allow for a greater level of access through the site and enable visitors to appreciate the ecological values that were previously not made available.

The site is constrained by the location of Robertson Rainforest. While the majority of new work to the hotel and the villas are located outside the identified rainforest areas, portions of the villas, cabins and roads intrude into this area (see Figure 3).



Source: X.Pace Design


 Intrusion into Rainforest Area

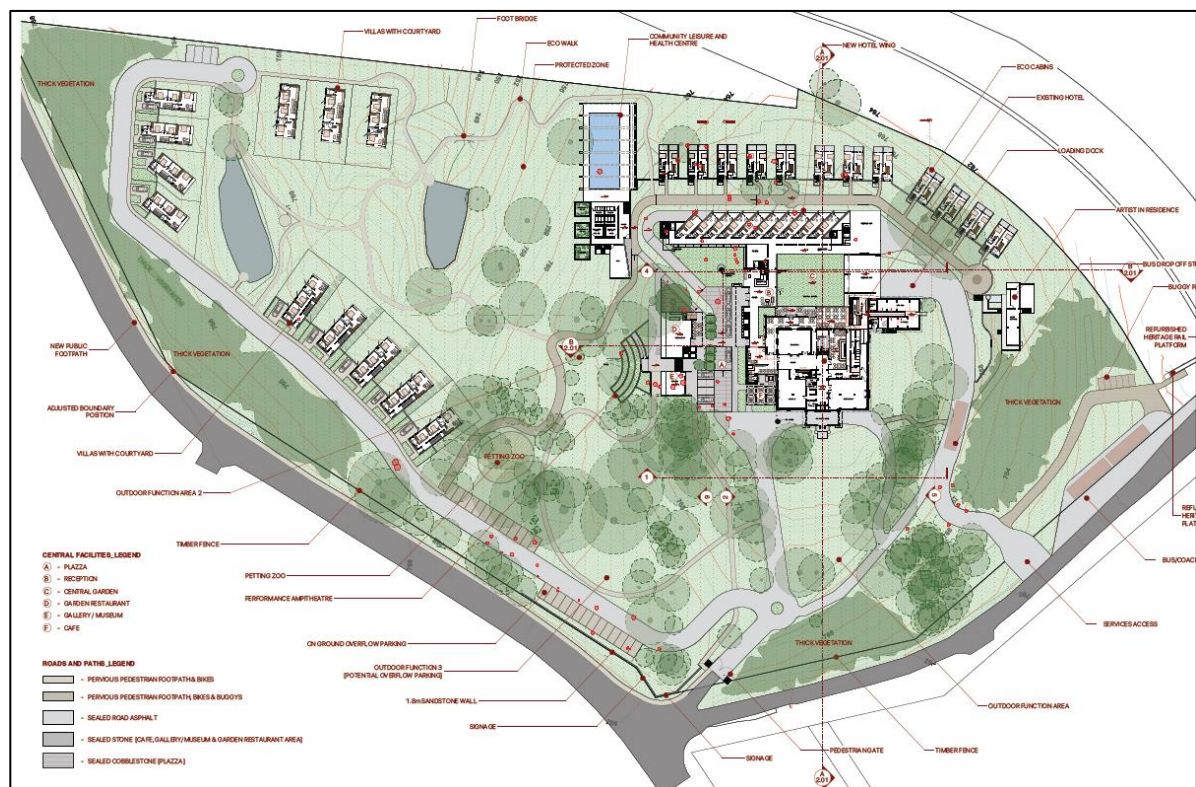
Figure 3: Design Constraints of Option A in the Context of the Site's Ecological Conditions

(note: some smaller internal pathways are located within the rainforest area but are not identified on this plan)

3.4.2 Masterplan Option B

Following consideration of the site's ecological conditions, the design was refined and presented to the site's owner as Option B (see Figure 4). The majority of the proposed works remained the same as Option A, with some further modifications and refinements as follows:

- Relocation and reorientation of the pool and spa areas;
- Relocation of the western and northern internal roads parallel to the Illawarra Highway further into the site and subsequent relocation of the villas;
- Removal of the helipad;
- Provision of a petting zoo;
- Provision of additional on-ground overflow parking as well as new bus/coach parking; and
- Refurbishment of the heritage listed railway platform to the south of the site



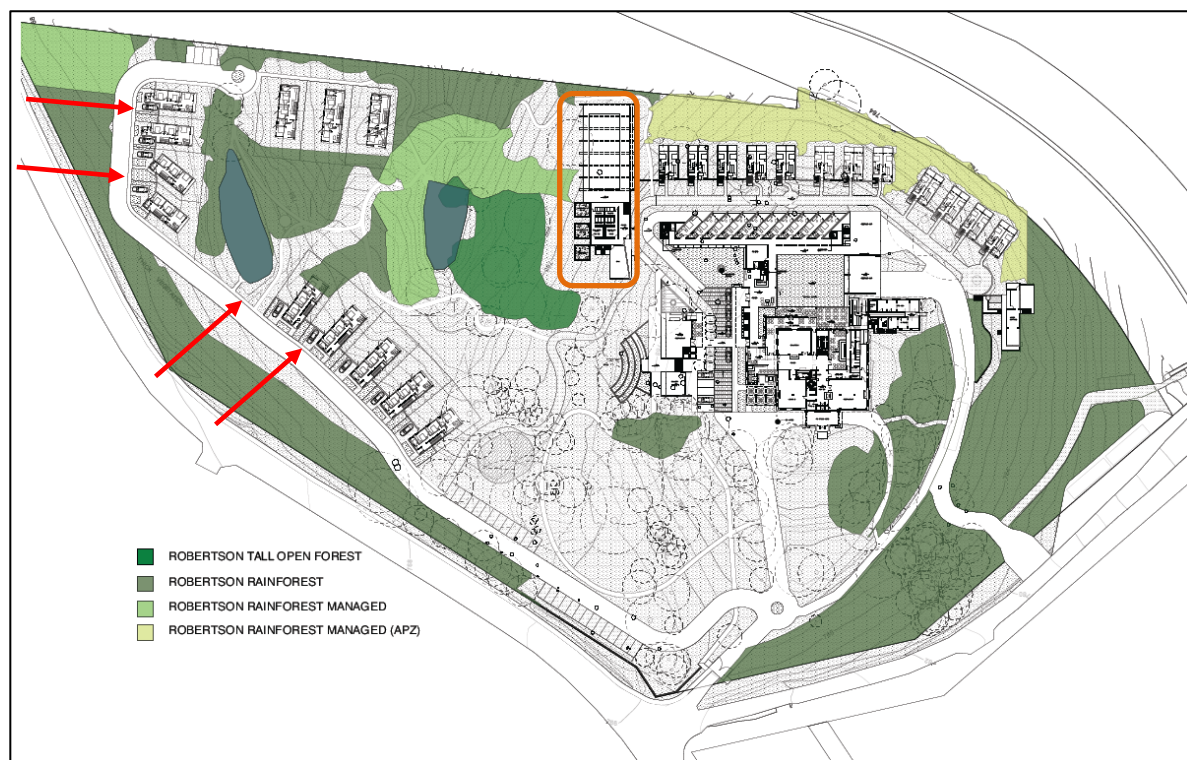
Source: X.Pace Design

Figure 4: Design Option B

Comment

This design is an improvement on Option A, as a number of design elements were relocated to avoid conflicts with the rainforest. Most notable are the increased setbacks of the internal roads and villas on the western and north western side of the site. This will enable the rainforest along the western and north western edge to flourish, maintain its existing appearance from the public domain and provide natural screening for the villas (see Figure 5 on the following page). Similarly, pool and spa were relocated to avoid conflict with the Robertson Tall Open Forest near the centre of the site and the helipad was removed given its location adjacent to the rainforest on the western side. General refinements to the internal pathways continue to provide access through to areas of the site that were not previously available.

While Option B provides improvements in the design, the cabins on the eastern side of the site intrude into the rainforest area to varying degrees.



Source: X.Pace Design



Rotation and relocation of pool and spa to avoid forest



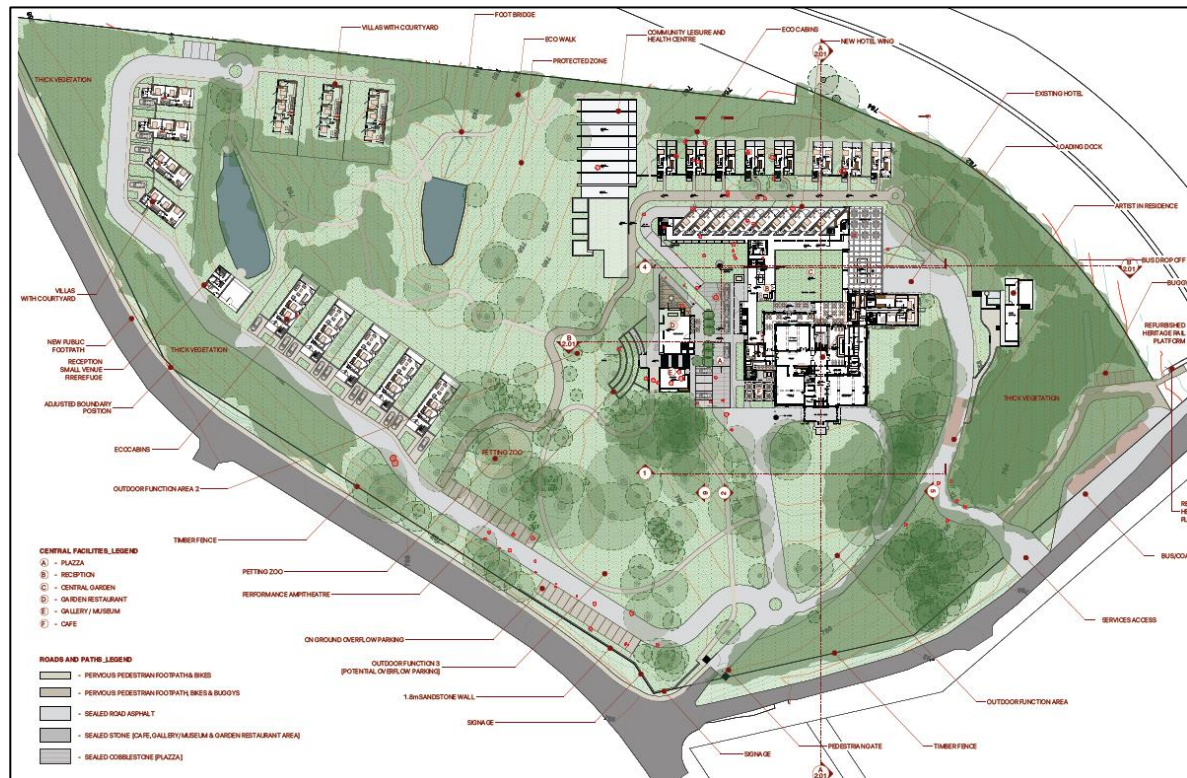
Increased setbacks on western and north western side to avoid conflict with rainforest

Figure 5: Design Constraints of Option B in the Context of the Site's Ecological Conditions

3.4.3 Masterplan Option C

The design of the proposal was further refined in Option C (see Figure 6). The majority of the proposed works remain the same as Option B, with the following modifications:

- Deletion of four eco-cabins on the eastern side;
- Replacement of five villas on the western side with five eco-cabins and provision of new reception and fire refuge; and
- Adjustment of the western and north western internal road to follow the outer line of the rainforest.

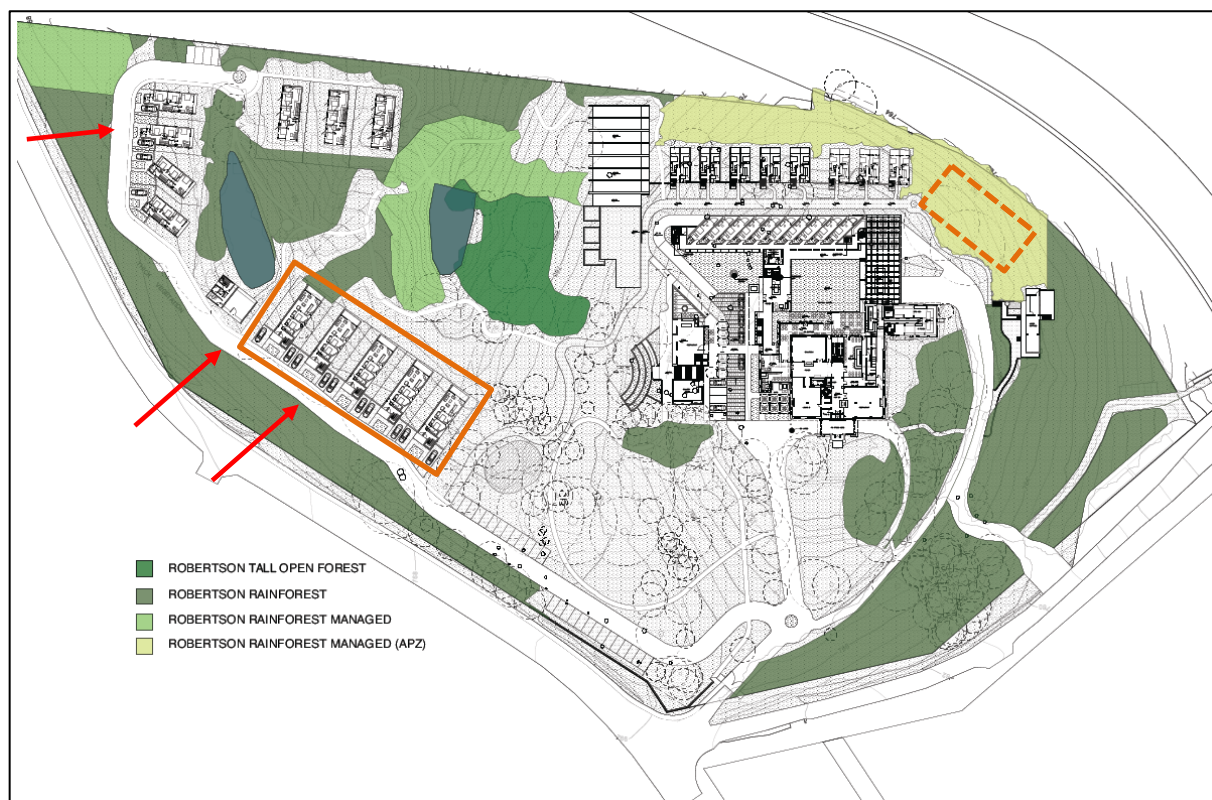


Source: X.Pace Design

Figure 6: Design Option C

Comment

This design is an improvement on Option B, and the preferred option for submission to Council. The new works continue to avoid conflict with the rainforests within the central, northern and western portion of the site, with the current width of the rainforest on the western side being restricted to 20m in width to avoid the requirement of a larger Asset Protection Zone (APZ) on advice by the Bushfire Consultant. While eco-cabins are still located within a rainforest area on the eastern side, the four cabins to be removed will reduce the intrusion and this is supported by specialist environmental consultant reports (see Figure 7 on the following page).



Source: X.Pace Design



Conversion of Villas into Eco Cabins to improve rainforest management



Removal of Eco-Cabins to reduce effects on rainforest



Alignment of internal road with edge of identified rainforest

Figure 7: Design Constraints of Option C in the Context of the Site's Ecological Conditions

4.0 CONCLUSION

This report has outlined the masterplan design options that were investigated as part of the design stage for the proposed redevelopment of The Robertson Hotel at No. 1 Fountaindale Road, Robertson.

The proposed design has been developed in consultation with a number of specialist consultants in order to avoid or minimise adverse impacts on the built and natural environment.

Option 4 was selected as the most preferred design scheme and was further developed to more thoroughly consider the site's environmental and ecological constraints while maintaining the owner's project brief.

This report is to be read in conjunction with the Statement of Environmental Effects prepared by GSA Planning and other specialist consultant reports that form part of the development application submission for this site. These reports will confirm the proposal is suitable in the locality and will maintain the built/natural environmental and ecological significance of the site. As important, the improved facilities on the site will positively contribute to the tourism industry and economy in the region.



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