BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

MEDIUM AND HIGH DENSITY RESIDENTIAL DEVELOPMENT

LOTS 1020 & 1021 DP 876671 AND LOT 2 DP 576773

1020 MELIA COURT, CASTLE HILL

Prepared by:

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Site Details:	LOTS 1020 & 1021 DP 876671 AND LOT 2 DP 576773 1020 Melia Court, Castle Hill
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Prepared for:	Castle Hill Glen Pty Ltd
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Abbreviations

Abbreviation	Meaning
AOBV	Areas of Outstanding Biodiversity Value
AWTS	Aerated Wastewater Treatment System
APZ	Asset Protection Zone (Bushfire Protection)
BAM	Biodiversity Assessment Methodology
BAM - C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
DA	Development Application
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
DEE	Department of Environment and Energy
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
HTE	High Threat Exotic
LEP	Local Environmental Plan
LGA	Local Government Area
MU	Map Unit
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
PCT	Native vegetation classification system approved by NSW Plant Community Type Control Panel
PFC	Projected Foliage Cover
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TBCD	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community

GLOSSARY

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPE) to apply the Biodiversity Assessment Method.
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.
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.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
Locality	A 1500m buffer area surrounding the Subject Land
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
Proposal	The development, subdivision, activity or action proposed.
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
Species credit	The class of biodiversity credit that relate to 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 footprint of the proposed development.
Subject Properties	1020 Melia Court, Castle Hill

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CERTIFICATION

I, Alex Fraser of Fraser Ecological, hereby state that this Biodiversity Development Assessment Report (BDAR) for a residential development at 1020 Melia Court, Castle Hill, has been prepared in accordance with the Biodiversity Assessment Method (BAM) 2020 established under the NSW *Biodiversity Conservation Act 2016*.

Fieldwork for this project was undertaken by Alex Fraser. Report writing was undertaken by Alex Fraser.

My qualifications are:

Alex Fraser, Principal Ecologist
B.Sc. (Hons)
Certificate 3 Natural Area Restoration
BAM Accredited Assessor (BAAS 18156)
Member of the Ecological Consultants Association of NSW

Conflicts of Interest

The Accredited Assessors have signed an agreement to abide by the Accredited BAM Assessor Code of Conduct. The authors declare in accordance with the Assessors Code of Conduct that no actual, perceived, or potential conflicts of interest exist.

Disclaimer

This document may only be used for the purposes for which it was commissioned. Fraser Ecological accepts no liability or responsibility in respect of any use or reliance upon this report by any third party. Unauthorised use of this report in any form is prohibited.

Alex Fraser
B.A Applied Science (Hons), Cert 3 Natural Area Restoration
BAAS18156 Accredited Assessor
Principal Ecologist, Fraser Ecological

EXECUTIVE SUMMARY

Fraser Ecological has been contracted to prepare a Biodiversity Development Assessment Report (BDAR) for a residential development ('the Proposal' or 'the Project') at 1020 Melia Court, Castle Hill, in The Hills Shire local government area.

This BDAR has been prepared in accordance with the Office of Environment and Heritage (OEH) (2020) Biodiversity Assessment Method (BAM). The Biodiversity Offset Scheme (BOS) applies to the Proposal, as it would require clearing of native vegetation that is mapped on the Biodiversity Values Map (BVM).

Plant Community Types (PCTs)

It was determined that best fit PCT occurring on-site is PCT 3136 – Blue Gum High Forest (BGHF). Blue Gum High Forest in the Sydney Basin Bioregion is listed as a Critically Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* and *Commonwealth EPBC Act 1999.*

The vegetation occurring on-site within a majority of the proposed development area is considered to be in poor to moderate condition (refer to Section 3.3.3 – Vegetation Integrity Scores). Both Council vegetation mapping and the NSW Statewide Vegetation Mapping System identifies the site as containing Blue Gum High Forest.

The extent of this vegetation community on-site was validated in the field surveys and mapped. The northern boundary of the site (Lot 1020 DP 876671 Melia Court) does not contain vegetation consistent with the mapped BGHF. It is dominated by introduced environmental weeds including *Ligustrum sinense* and *Ligustrum lucidum* with occasional occurrence of *Pittosporum undulatum* and *Glochidion ferdinandi*.

The central portion of the site is dominated introduced grasses including Kikuyu (*Pennisteum clandestinum*) with one isolated planted Brushbox *Lophostemon confertus* near the entrance of the site. Introduced weeds occurring in this same location include Giant Reed (*Arundo donax*), *Lantana camara* and Arum Lily (*Zantedeschia aethiopica*).

The eastern portion of the proposed development area includes isolated BGHF trees (*Eucalyptus saligna*) and regenerating shrubs - *Acacia implexa* with almost no other native shrub or groundcover species. The southern-most portion of the proposed development area includes moderate condition BGHF dominated by *Eucalyptus saligna* trees heavily infested with introduced weedy vines such as *Ipomoea indica* (Morning Glory).

Fauna habitat

The site for the proposed development predominantly occurs in existing cleared land or area with scattered remnant trees or highly weed infested remnant BGHF forest. Therefore, the overall quality of fauna habitat is considered to be low.

However, the main development impact area provides fauna habitat in the following forms:

- Seasonal foraging resources when eucalypts and other plants flower provide nectar and insect resources for mobile fauna including Grey-headed Flying Fox, possums, gliders, microchiropteran bats and a variety of woodland bird species (breeding habitat absent)
- Seasonal sources of seed on the forest floor and grasses and acacias for parrots
- Bird species likely to occur include parrots and nectivorous honeyeaters that forage and roost in the upper canopy of the trees. Blossoms from flowering canopy Myrtaceae would attract a variety of nectivores including possums, birds and threatened Grey-headed Flying Fox.

The southern forested areas of the site may contain hollow-bearing trees that could not be visible as there were engulfed in environmental weedy vines (*Ipomoea indica* – Morning Glory). As a precautionary measure it has been assumed that habitat for these species maybe present These habits will be restored via the proposed Vegetation Management Plan.

Targeted surveys were undertaken for Dural Land Snail (*Pommerhelix duralensis*) as the author has previously recorded this species in the locality. This species was no detected in the immediate development impact area, however, this species is highly cryptic and some areas of the southern forest were not accessible due to weedy overgrowth. Therefore, we have assumed presence as a precautionary measure and created a species polygon for credit retirement in case it is indirectly impacted by the proposal.

Two threatened species of fauna, the Powerful Owl and Grey-headed Flying-fox, were detected (vocalisations) during surveys of the subject land. The Powerful Owl was heard from the southern portion of the property boundary during targeted nocturnal surveys possibly on neighbouring lands. No potential nest trees of the Powerful Owl were identified but due to the large amount of overgrown vine impeding access, we have assumed presence of this species. A species polygon, which encompasses the combined buffers for potential nest trees has been applied to this species.

The subject land may contain potential nest trees for the Gang-gang Cockatoo (in the southern forest overgrown with vines). A species polygon, which encompasses the combined buffers for potential nest trees has been applied to this species.

Proposed impact summary

The Arborist Impact Assessment Report (AIA) prepared by H20 Consulting identifies that There are 209 trees located within the proposal footprint, which will require removal (Table 4 & Figure 3 of the AIA).

This includes 69 BGHF trees. The AIA states that 72 High Retention Value trees occur within the proposal footprint and will require removal to allow for construction works.

The total area of the site is 4.5 hectares of which approximately 1ha comprises of moderate condition BGHF proposed for removal (Figure 11 – Vegetation Zone B). It still contains a high level of weed invasion.

The total area of introduced environmental weeds or highly degraded BGHF comprises of approximately 1.5ha of the proposed development footprint (including APZ and internal roads). This includes Vegetation Zones A, C and D.

The total remaining approximate area of 0.8 ha of moderate condition BGHF vegetation (outside proposed APZs) is to be protected and enhanced via the proposed Vegetation Management Plan (prepared by Fraser Ecological Consulting) comprises approximately 1.5ha (refer to Figure 12).

Vegetation Integrity Scores:

PCT	Vegetation Zone	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3136	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	0.64	2	27.7	26.2	11.3
PCT 3136	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	0.9	4.9	35.7	40.6	19.2
Unclassified/ non conformant with a PCT	Vegetation Zone C: Non-native vegetation - exotic grassland	0.71	n/a	n/a	n/a	n/a
Unclassified/ non conformant with a PCT	Vegetation Zone D: Non-native vegetation - exotic grassland	0.24	n/a	n/a	n/a	n/a

Biodiversity credit retirement

Vegetation Zones Requiring an Offset:

PCT	Vegetation Zone	Area (ha)	Vegetation Integrity Score	Credits required
PCT 3136	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	0.64	11.3	0
PCT 3136	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	0.9	19.2	8
Unclassified/ non conformant with a PCT	Vegetation Zone C: Non-native vegetation - exotic grassland	0.71	n/a	0
Unclassified/ non conformant with a PCT	Vegetation Zone D: Non-native vegetation - exotic grassland	0.24	n/a	0

Threatened Species Requiring an Offset:

Species	Area of Impacted Habitat (ha)	SAII entity	Number of Species Credits Required
Powerful Owl	1.9 ha (buffered 100m from potential HBTs potential disguised by overgrown vines)	No	10
Gang Gang Cockatoo	1.9 ha (buffered 100m from potential HBTs potential disguised by overgrown vines)	No	10
Pommerhelix duralensis / Dural Land Snail	1.9 ha (highly cryptic species therefore assumed present as a precautionary measure)	No	10

Impact mitigation measures

The proposal includes measures for the dedication and future protection of the BGHF in the southern portion of Lot 2 DP 576773 Glen Road CASTLE HILL NSW 2154 to be subject to a Vegetation Management Plan (potentially under a Planning Agreement relating to the land). This area is to be placed under an 88B restriction as to its use and enforced under Section 88E of the Conveyancing Act, 1919.

The ecological integrity of the remaining 0.8ha of the Endangered Ecological Community is to be maintained (outside the proposed APZs).

All Asset Protection Zones are to be located outside the area which will be subject to the Vegetation Management Plan (VMP) and the 88B restriction as to its use. The separate VMP (prepared by Fraser Ecological) has been lodged with the current development application.

Any fauna impacts during construction works can be mitigated via the provision of a Wildlife Management Plan provided prior to the release of the Construction Certificate.

Serious and Irreversible Impacts (SAII's)

Species and ecological communities with a 'very high' biodiversity risk weighting will be a potential serious and irreversible impact (SAII). These 'potential SAII entities' are identified within the BAM calculator (OEH 2018b).

The determination of serious and irreversible impacts on biodiversity values is to be made by the consent authority in accordance with the principles set out in the BC Regulation.

To assist the consent authority, the guidance document Guidance to assist a decision-maker to determine a serious and irreversible impact includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation to identify the species and ecological communities that are likely to be the subject of serious and irreversible impacts.

BGHF is listed as a threatened SAII entity.

Please refer to SAII assessment for this species provided in Section 4.2.1 (Table 21).

No SAII listed species were recorded or considered likely to occur on-site.

1 INTRODUCTION

Fraser Ecological has been engaged to provide a Biodiversity Development Assessment Report (BDAR) for the proposed residential development at 1020 Melia Court CASTLE HILL located in The Hills Shire Council LGA.

See Figure 1 and 2 for the location & aerial maps showing property boundaries.

The subject site itself is on the NSW DPE's Sensitive Biodiversity Values Map (https://www.environment.nsw.gov.au/biodiversity/biodiversity-values-map.htm) (Figure 4) which is the legislative trigger for this report.

BAM plot/ quadrat and targeted fauna surveys were undertaken on in July, August and September 2023.

1.1 Description of the site and proposal

Fraser Ecological was commissioned by EinV on behalf of Castle Hill Glen Pty Ltd (Property Owner) to provide an Arboricultural Impact Assessment (AIA) report for trees at 1020 Melia Court, Castle Hill (subject site). The subject site is located within The Hills Shire Council Local Government Area (LGA) (Figure 1).

The site has a DA Approved Subdivision for 21 residential lots. As part of this approval, previous surveys of trees on the site were undertaken in 2006 (Hawkeswood 2006) and later additional surveys in 2017 (TALC 2017).

The project involves the re-development of 1020 Melia Court in Castle Hill for Planning Proposal Application to the Hills Shire Council. The site is to be developed for a mix of low and medium density residential buildings including a new public park, series of open spaces and public domain upgrades.

The project includes:

- A Publicly Accessible Park "Rogans Hill Park" that is designed to provide a natural play area and outdoor fitness opportunities.
- Six (6) residential flat buildings, with heights ranging from three to six storeys, containing 147 apartment units.
- 38 terraces, each spanning between two and three stories.
- A series of connected biodiversity corridors connecting the existing Blue Gum High Forest and WSUD infrastructure that provide new opportunities for habitat for local flora and fauna.
- A central loop road to enhance accessibility and circulation to each public and communal space.

Table 1 Site Particulars, Terminology and Definitions

Term	Definition
Subject Land	Lot 1020 DP 876671 Melia Court CASTLE HILL NSW 2154 Lot 1021 DP 876671 Glen Road CASTLE HILL Lot 2 DP 576773 Glen Road CASTLE HILL NSW 2154
Subject Land Area	4.5 hectares (ha) – all 3 lots mentioned above combined
Development Footprint	The footprint of the works proposed as part of the subdivision (ie roads and services) and the likely footprint of future residential development (ie building envelopes, landscaped areas, driveways, OSD basins and other engineered structures). This would be equivalent to the "*operational footprint*".
APZ Impact	Areas subject to future IPA & OPA requirements (refer to Black Ash Consulting Report)
Canopy Impact	Areas of native canopy outside mapped native vegetation
Impact Area	A combination of the Development Footprint, APZ Impact and Canopy Impact. This would be equivalent to the "*construction footprint*".
The Forest	An area of bushland in the south of the subject land which will be set aside for conservation
Local Government Area	The Hills Shire Council
Land Zoning	C4 ENVIRONMENTAL LIVING
Biodiversity	The site is not mapped as Biodiversity on the Hills Shire LEP (2019) terrestrial biodiversity map

1.2 Aim and Approach

This report has been prepared in accordance with the BAM (DPIE 2020a) 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 SAIIs 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 as to the number and class of offset credits required to be purchased and retired as a result of the proposal.

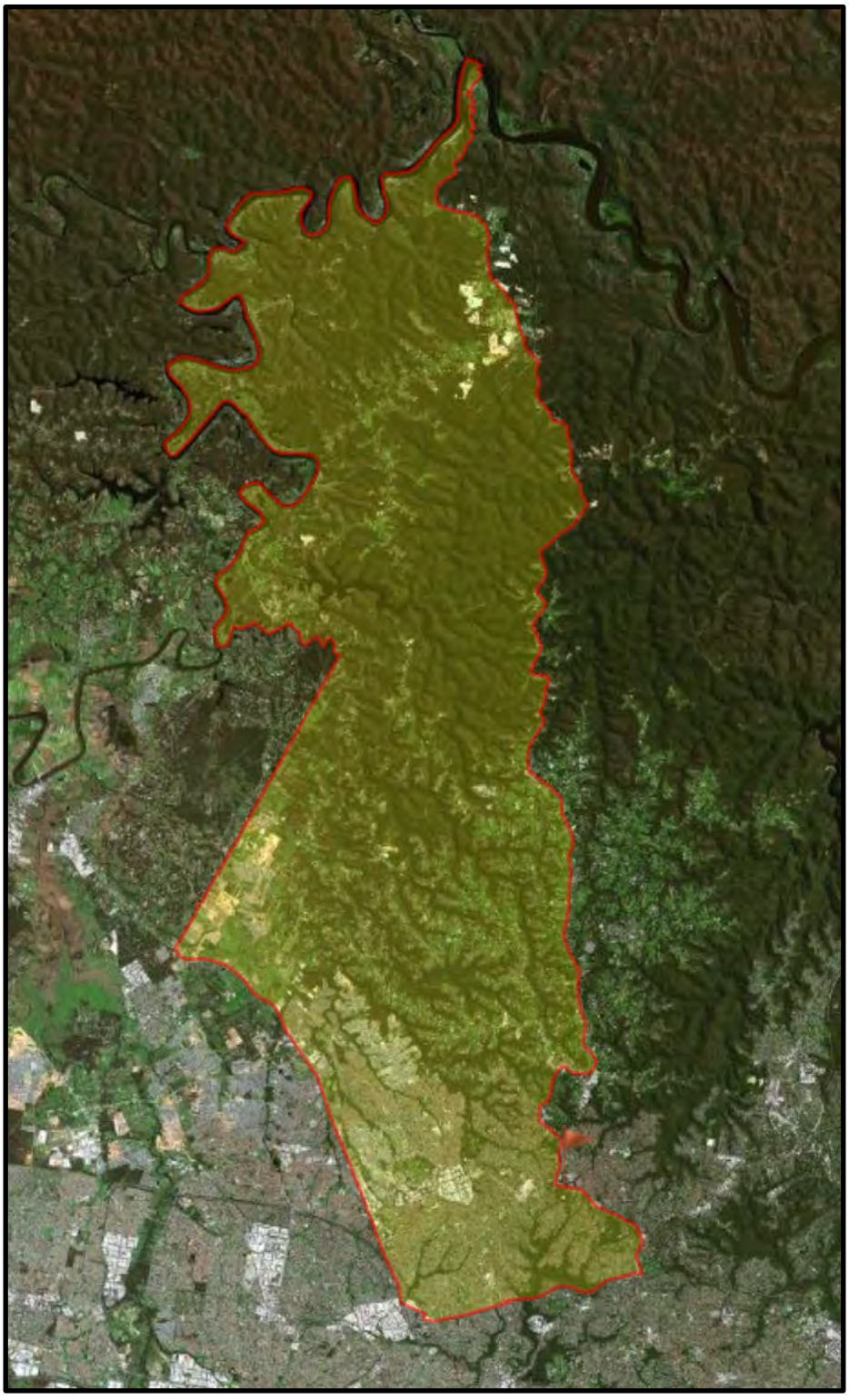

Figure 1: The site in relation to The Hills Shire Council LGA extent map (Source: SIX Maps.com)

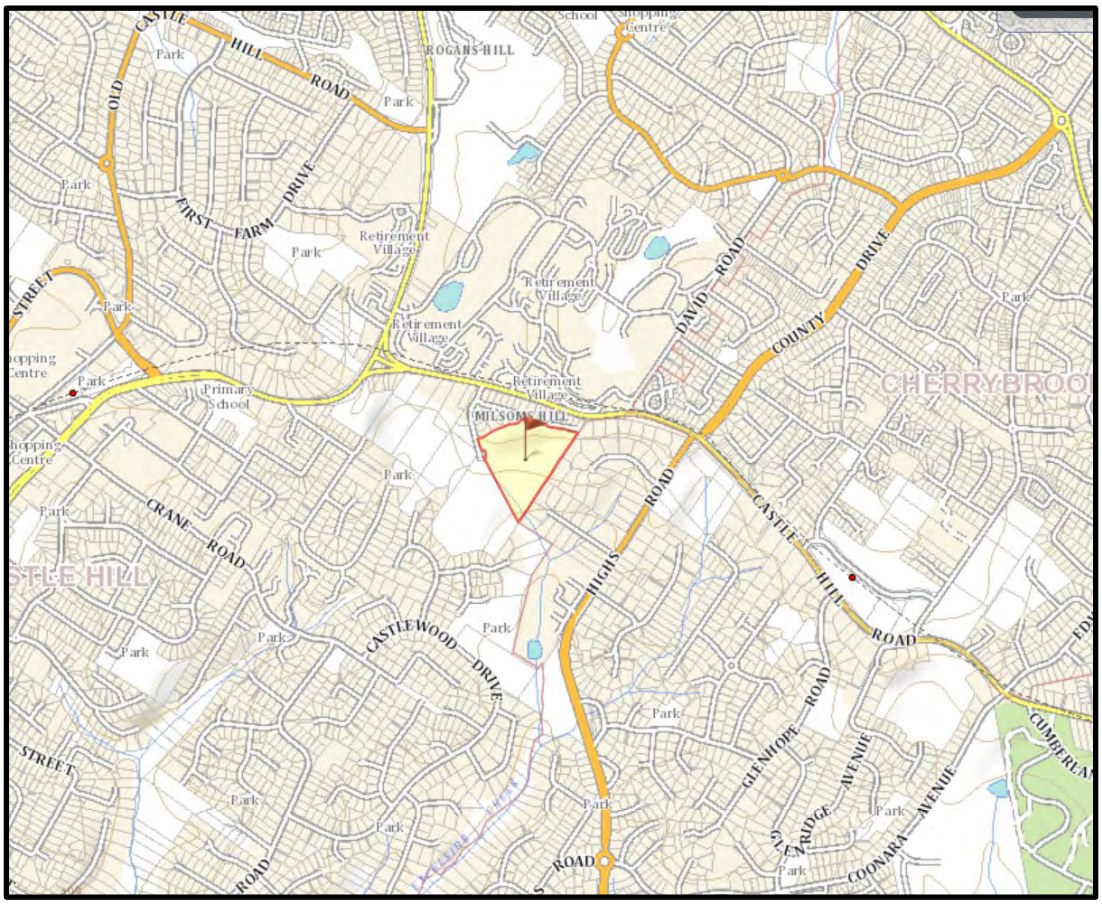

Figure 2: Locality aerial map (Source: SIX Maps.com)

Figure 3: Aerial map showing property boundaries (Source: Nearmap.com)

Figure 4 1943 aerial imagery of the subject site

Figure 5: Sensitive biodiversity values map (Source: NSW DPE accessed 25/9/23)

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Figure 1: Site Details

Subject Site

NSW Cadastre GDA2020

NSW Strahler Stream Order

1

Development Footprint

Development Footprint

Asset Protection Zone IPZ

Asset Protection Zone OPZ

NOTE: Development Plans have been geo-rectified from Aerial Imagery Not Survey Accurate on Map. For Illustration Purposes ONLY

Plans - DKO Site Plan - Ground
No. SD16.11 Rev. 19/10/2023

Base Spatial Layers - NSW State Dept Open Source Accurate as of Sept 2023 GDA2020

DATE : 12/12/2023
Map Version: 1_4

Aerial Imagery: Nearmap 12/08/2023
GDA2020

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:1,200

Although all care has been taken WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data.

Sub Region: Yengo

Sub Region: Pittwater

Sub Region: Cumberland

M2 Motorway

Cherrybrook

Milsoms Hill

Melia Court

Basement 0
2629sqm (~61%)

Terrace Garden

Entry Park

Common Green

Pocket Green

Royan Hill Park

Hoop Pine Place

01 Ground - No Trees

DKO

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PRELIMINARY

Project Name	Melia Gardens
Project Number	13293
Date	19/10/2023
Scale	@A3
Drawing Name	Site Plan - Ground
Drawing Number	SD16.11
Revision	

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 20 40 60 80 100 200 Meters

nearmap

1.2.1 Database Searches

The following database searches were undertaken, in order to compile a list of threatened flora and fauna species predicted to occur in the area:

- Review of threatened fauna and flora records within a 10 km radius of the site, contained in the NSW BioNet database.
- Review of the MNES records within a 10 km radius of the site, using the Commonwealth Department of Environment and Energy (DEE), EPBC Act Protected Matters Search Tool.

1.2.2 Vegetation Mapping

Southeast NSW Native Vegetation Classification and Mapping (NSW OEH 2011 update)- SCIVI. VIS_ID 2230

Classification and descriptions of native vegetation types of southeast NSW (including the South Coast and parts of the eastern tablelands), and map of extant distribution of these veg types at 1:100 000 interpretation scale. Based on the South Coast - Illawarra Vegetation Integration (SCIVI) Project, which aimed to integrate many previous vegetation classification and mapping works to produce a single regional classification and map plus information on regional conservation status of vegetation types, to inform the South Coast and Illawarra Regional Strategies. Vegetation classification based on a compilation of ~ 8,500 full-floristic field survey sites from previous studies. Classified vegetation types referred to previous studies. Distribution of veg types was mapped by spatial interpolation (modelling) from classified sites, using a hybrid decision-tree/expert system. Final model was cut to \'extant\' boundaries using a compiled coverage of aerial photograph interpretation (API) of woody and wetland vegetation boundaries. A total of 189 vegetation types were identified, and types related to Endangered Ecological Communities are highlighted.; VIS_ID 2230.

NSW State Vegetation Type Map (Department of Planning and Environment 2022)

The State Vegetation Type Map (SVTM) is a regional-scale map of NSW Plant Community Types. This map represents the current extent of each Plant Community Type, Vegetation Class and Vegetation Formation, across all tenures in NSW. Further, a SVTM map of pre-clearing is also available separately here. This map is updated periodically as part of the Integrated BioNet Vegetation Data program to improve quality and alignment to the NSW vegetation classification hierarchy.

It is accessed via the following link:

https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map

This release represents the first state-wide vegetation coverage using the NSW vegetation classification hierarchy, including the revised eastern NSW PCT classification C1.1. The "M1" in the version release number (C1.1.M1), represents the first map release against PCT master list version C1.1

This coverage supersedes pre-release versions (v1.1 and v1.1.1) and 7 individual prior regional coverages including: Sydney Metropolitan Area Mapping, SVTM Border Rivers Gwydir – Namoi, SVTM Central West – Lachlan, SVTM Riverina – Murray, SVTM Western, SVTM Central Tablelands, and SVTM Upper Hunter.

Limitations on Use: This mapping data may be used as a guide to the occurrence and distribution of Plant Community Types, Vegetation Classes, and Vegetation Formations, before and after clearing.

Users of these maps should note the following issues which will be address in future SVTM versions:

- PCT attribution errors – corrected as better information becomes available Spatial errors or omissions (eg, gaps and slithers or mapping linework inaccuracies)
- Eastern NSW PCT classification topologies differ from central and western NSW classification topologies
- Some PCTs mapped as part of earlier regional coverages have since been discontinued
- Some PCTs approved in BioNet have not been mapped due to technical issues
- Spatial and data gaps and discontinuities may occur at the edges of former regional coverages.
- Pre-clearing coverage for central NSW is not currently available

Map data may be downloaded, viewed within the SEED Map Viewer, or accessed via the underlying ArcGIS REST Services or WMS for integration in GIS or business applications.

The Trees Near Me NSW app provides quick access to view the map using a mobile device or desktop. Download the app from Google Play or the App Store, or access the web site at https://treesnearme.app.

1.2.3 Literature Review

Information sources reviewed included, but were not necessarily limited to:

- Aerial Photograph Interpretation (API);
- Relevant guidelines, including:
  - OEH *Biodiversity Assessment Method*, 2017 No 469
  - *NSW Guide to Surveying Threatened Plants* (OEH, 2016)

- *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018)
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation (DEC), 2004)

- OEH Threatened Species, Populations and Ecological Communities website
- Commonwealth DEE Species, Profile and Threats Database;
- OEH Threatened Species, Populations and Ecological Communities website
- Commonwealth DEE Species, Profile and Threats Database;
- Threatened species survey and assessment guidelines: field survey methods for fauna: Amphibians (DEC 2009);
- NSW Guideline to Surveying Threatened Plants (OEH 2016b);
- Operational Manual for BioMetric 3.1. (DECCW 2011);
- Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010a);
- Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999(Commonwealth of Australia 2010b);
- Survey guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010c);
- Survey guidelines for Australia's threatened mammals. Guidelines for detecting
- mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2011);
- Survey guidelines for Australia's threatened orchids.
- Guidelines for detecting bats listed as 'threatened' under the Environment Protection and Biodiversity Conservation Act 1999(Commonwealth of Australia 2013).
- The NSW BioNet (DPIE 2021a) and Protected Matters Search Tool (DAWE 2021a) for previous records of threatened species, populations and ecological communities within a 10 km radius centred on the centre of the subject land.
- The NSW BioNet 'Threatened Biodiversity Data Collection' (DPIE 2021a), Final Determinations (TSC 2021) and Species Profile and Threats Database (DAWE 2021b) for information on threatened species, populations and ecological communities.

It was not possible to determine with certainty all the fauna that utilise habitats in the subject site. This is because of the likely seasonal occurrences of some fauna species, the occasional occurrence of vagrant species, and because some species are difficult to detect because of their timid or cryptic behaviour. Therefore, in addition to targeted fauna surveys, investigations comprised an assessment of fauna habitats present on site and an indication of their potential to support native wildlife populations and, in particular, threatened species.

1.2.4 Other sources and consultant reports

A desktop survey was performed to ensure all relevant documentation is considered when preparing the plan. Documents and other information resources utilised include:

- Aerial photographs (Google Maps, NearMaps & DPI Land Information)
- NSW Land and Property Information SIX Maps Viewer (https://maps.six.nsw.gov.au/)
- The Southeast NSW Native Vegetation Classification and Mapping (NSW OEH 2010) mapped using QGIS software overlaid with cadastral boundaries obtained from the NSW Planning Portal database collection
- NSW State Vegetation Type Map (Department of Planning and Environment 2023)
- Soil Landscapes of the Sydney 1:100,000 Sheet (Chapman and Murphy 1989) using the Espade Version 2.0 managed by the NSW DPE accessed 5th October 2023
- Arborist Impact Assessment Report (AIA) prepared by H20 Consulting
- Bushfire Assessment report prepared by Black Ash Consulting
- Proposed development layout plans

1.2.5 Targeted fauna survey methodology

It was not possible to determine with certainty all the fauna that utilise habitats in the subject site. This is because of the likely seasonal occurrences of some fauna species, the occasional occurrence of vagrant species, and because some species are difficult to detect because of their timid or cryptic behaviour. Therefore, fauna investigations comprised an assessment of fauna habitats present on site and an indication of their potential to support native wildlife populations and, in particular, threatened species.

The fauna habitat assessment criteria included:

Mammals: extent of ground cover, shrub layer and tree canopy, hollow-bearing trees, substrate type (for burrowing etc), evidence such as droppings, diggings, footprints, scratches on trees, nests, burrow paths and runways.
Birds: structural; features such as the extent and nature of the canopy, understorey and ground strata and flowering character
Reptiles and amphibians: cover shelter, suitable substrate, basking and breeding site availability, reptiles and frogs sough in likely sheltering places
Invertebrates: logs and other debris, leaf and bark accumulations around base of trees, grass clumps, loose soil for burrowing
Wildlife corridor values: Importance of the creek systems and riparian vegetation as movement corridors for fauna, especially birds, aquatic fauna, mammals (e.g. microchiropteran bats) & amphibians

The total amount of survey effort is provided within Table 2.

The targeted fauna surveys were undertaken by Alex Fraser that complied with NSW Office of Environment & Heritage Survey requirements (draft 2004) were employed to ascertain impacts of the proposed development on threatened fauna. These requirements can be viewed at:

http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf

http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf

Table 2 Fauna survey effort

Technique employed	Species targeted	Survey Dates	Total survey effort
Call playback	Large Forest Owls, Gliders and Koala	18-21st August 2023	Three consecutive nights
Spotlighting	All nocturnal fauna	18-21st August 2023	Three consecutive nights
Diurnal survey methods	Birds	18-21st August 2023	Three consecutive nights
Song-meter recording device	Variety of fauna vocalisations	18-21st August 2023	Three consecutive nights
Anabat	Microchiropteran bats	Not yet undertaken as surveys needs to commence in November	Five consecutive nights x 2 sessions are required
Targeted frog survey	Frogs	18-21st August 2022	Three consecutive nights (12 person hours)
General habitat searches (parallel transects)	All fauna	18-21st August 2022	Over 15 person hours

Targeted survey methods

A full description of these survey methods are described as follows:

Call playback (Large Forest Owls)

The focus of the call payback survey was on Barking Owl, Masked Owl, Sooty Owl and Powerful Owl. At various locations of the site on different nights, a five minute listening period was conducted in order to detect 'voluntary' calling of resident birds. This was followed by a call playback session consisting of five minutes of intermittent calls for each of the three targeted species, with listening periods interspersed between calls. Calls of the Powerful Owl were played first to accommodate their slower response time (T Soderquist pers. comm.), followed by the Masked Owl, Sooty Owl and finally the Barking Owl. The call playback sessions were then followed by a 20-minute period of listening during which spotlighting was conducted on a 1 ha circular plot (i.e. approx. 57 m radius). Therefore, between 40 and 50 minutes was spent at each site.

Other information recorded, particularly for the target species included: species detected, number of individuals, response intensity, initial distance and direction of responses, and also additional vertebrates responding or otherwise detected.

Spotlighting (All nocturnal fauna species)

Spotlight searches were mainly at targeting Large Forest Owls and Petaurus gliders. The smaller Petaurus gliders are often difficult to detect by spotlight as their eyes do not reflect brightly, and often remain stationary when in the spotlight beam (Menkhorst et al., 1988). Larger gliders such as Yellow-bellied Glider and Greater Glider, and possums such as Common Brushtail Possum and Common Ringtail Possum are more easily detected by spotlight.

Vocalisations by the Sugar Glider, Yellow-bellied Glider, Common Ringtail Possum, Common Brushtail Possum, Koala, and very rarely the Squirrel Glider, will also indicate their presence.

During these surveys, spotlighting (using 100 watt hand held spotlights) was undertaken by 2-3 surveyors per spotlight session. The spotlighting transects were all walked on foot, these transects being chosen as they sampled all of the vegetation present. The spotlighting sessions commenced on either dusk or after 9pm and lasted between 30-45 minutes. During the spotlighting sessions, efforts were made to target those habitats considered suitable for nocturnal animals, particularly those of conservation significance identified during the literature review process.

Diurnal survey methods (birds)

Systematic surveys designed to capture peak activity (dawn chorus and prior to 10 am) were undertaken on five mornings and afternoons. Any birds sighted or heard calling during other survey activities were recorded.

Bird surveys, generally lasting for twenty minutes, were undertaken during the early morning and dusk periods. During this time, the principal investigator and assistant ecologist traversed those all portions of the study area observing and identifying by call recognition any birds present. Whilst traversing the site, any evidence that indicated the presence of a fauna species (i.e. characteristic tracks, diggings, scats, crushed cones

and so forth) was identified. Carnivore scats were also sought in an attempt to identify predator and prey species.

Song-meter recording device

The Song Meter SM2+ is a digital audio / ultrasonic recorder specifically designed for scheduled recording of wildlife vocalisations. The one device can be employed to remotely monitor and record ultrasonic bat calls, bird song and frog calls. All amplitude and harmonic information is preserved onto a SD card. It is capable of 740 hours of highest sample rate audio recordings, or over 17000 hours at the lowest setting. It is also capable of recording frogs/birds on one channel and bats on the other simultaneously. SM2+ automatically adjusts for changing dawn and dusk times. The device recorded sounds as WAV files which were analysed after the field survey period.

Two song–meters were simultaneously deployed for 3 consecutive nights at a time for a total of 2 different locations across the site. Each device recorded for one hour at 8am (one hour after sunrise), 4pm (one hour before sunrise) and 9pm to optimise detection of birds (diurnal and nocturnal as well as other potential fauna species.

The main focus of the recordings were to identify the presence of threatened species.

Microchiropteran bat surveys

During the nocturnal surveys, the identification of microchiropteran bats, using two (2) Anabat ZCAIM echolocation detectors was undertaken. Two (2) detectors were used to identify the presence of these species were placed at 3 locations within the study area. These detectors were established prior to dusk and were left in place for 14 consecutive nights for 2 sessions.

Any calls recorded were uploaded onto Analook W Software by Fraser Ecological using reference call guide in accordance with:

Pennay, M., Law, B., Reinhold, L. (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats. NSW Department of Environment and Conservation, Hurstville.

Amphibians

Frog searches were completed at all locations where frogs were heard vocalising to confirm species identification. Species were recorded by sightings, captures and call characteristics.

Amphibians were surveyed by vocal call identification, by using a recorder to record male calls in suitable places and then comparing these to known calls. Amphibians were also surveyed by habitat searches.

Any amphibians found are visually identified and when required to be examined are handled with Latex gloves and kept moist until release. Spotlighting for nocturnal mammalian fauna was carried out using a 220 Lumens LED head torch and a 100W halogen hand held lamp.

Species of herpetofauna were also opportunistically recorded whilst completing vegetation surveys and habitat assessments.

Reptiles

Searches for reptiles in likely localities such as under logs, sandstone, sandstone cliffs, ground debris and leaf litter throughout the study area. Surveys were undertaken during diurnal visits to the site. Spotlighting of terrestrial habitats suitable for reptiles also occurred during the nocturnal amphibian surveys.

Invertebrate surveys

Targeted searches for threatened snails using random meander and $1m^2$ quadrats placed in areas of leaflitter and refuse where access was possible. The southern portion of the site is highly overgrown with dense weedy vine and *Lantana camara*.

Koala habitat assessment

In order to identify Koala habitat and activity levels, the 'spot assessment technique' was used to determine the significance of Koala habitat. This involved sampling a minimum of 20 trees within a circle radiating from a central point. Searches for Koala scats or faecal pellets were conducted at the base of each tree for a maximum of two to three person minutes.

Minimum sampling density is one plot per 1,000 m^2 of potential development areas that contain native trees (Phillips and Callaghan, 1995). The validation of this technique is based on the occurrence of high quality habitat on medium to high-fertility soils, and is indicated as under evaluation on low fertility soils (Phillips and Callaghan, 1995).

Environmental conditions during survey

During the August 2023 targeted fauna surveys, the weather conditions for the call playback and spotlighting survey period were cold to mild with average temperature between 19 -21 degrees Celsius. During the spotlighting and call playback nights there was minimal wind (average 5km NE winds) and no rainfall. Cloud cover was moderate (50%) and the moon phase range was a waxing crescent (19% full) with the new moon to occurring on the 15th August 2023. These were ideal conditions for nocturnal call playback surveys over the survey period during optimal detection for large forest owls.

Figure 6 Location of targeted fauna surveys

Legend

- Anabat
- Song meter
- Call playback
- Spotlighting route
- Dural Land Snail and targeted flora searches

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Figure X: Location of targeted surveys

2 LANDSCAPE FEATURES

Landscape features, as applicable to the subject land, are summarised in Table 3.

Table 3 Summary of Landscape Features

Landscape Feature	Name and Comment
IBRA Region	The subject land lies within the Sydney Basin IBRA Region on the central east coast of NSW. This region occupies 4.35% of NSW and extends from just north of Batemans Bay to Nelson Bay and almost as far west as Mudgee (NPWS 2003). The region is dominated by temperate climate characterised by warm summers with no dry season.
IBRA Sub Region	The subject land is at the edge of the Cumberland IBRA Subregion, close to the boundary of the Pittwater IBRA Subregion. The Cumberland Subregion is characterised by Triassic Wianamatta groups shales and sandstones. The Pittwater IBRA Subregion is characterised by Triassic Hawkesbury Sandstone with thin ridge cappings of Ashfield Shale. Shale caps of the Pittwater IBRA Subregion typically support tall forest of Sydney Blue Gum and Blackbutt or Turpentine and Grey Ironbark (NPWS 2003).
NSW Landscape (Mitchell 2002)	The subject land occurs wholly within the Pennant Hills Ridges Mitchell landscape. This landscape is described as rolling to moderately steep hills on horizontal Triassic shales and siltstones. General elevation ranges from 10 to 90 m above sea level, with local relief of 60 m. Soils are deep red texture-contrast soils on narrow hillcrests, red and brown to yellow texture-contrast soils on slopes becoming slightly harsher in drainage lines. Vegetation is typically composed of tall open forests of *Eucalyptus saligna*, *Syncarpia glomulifera*, *E. pilularis*, *E. globoidea*, *E. paniculata*, *Allocasuarina torulosa* and *Angophora floribunda*. Rainforest elements occur in protected moist gully heads with *Pittosporum undulatum*, *Glochidion ferdinandi*, *Ficus coronata* and *Callicoma serratifolia*.
Rivers, streams and estuaries (classified according to stream order and including riparian buffers)	There are no rivers, streams or estuaries on the subject land. The catchment of Excelsior Creek occurs downslope of the site boundary.
Important and local wetlands on, adjacent and downstream of the subject land	There are no wetlands (DPIE 2010b) or important wetlands (ie as listed under the Directory of Important Wetlands or Coastal Management State Environmental Planning Policy) within the landscape buffer of the site.
Habitat connectivity identifying the area/s of connectivity joining different areas of habitat that intersect with the subject land and the areas of habitat that are connected.	Within the subject land native vegetation is concentrated along the southern portion of the site. Whilst the subject land is surrounded by the highly developed residential suburb of Castle Hill, the southern bushland ultimately connects to the bushland catchment of Excelsior Creek occurs downslope of the site boundary. Whilst roads and residential properties would act as a significant barrier for the movement of wildlife, the more urbanised and mobile species of fauna (such as the Brushtail Possum and Powerful Owl)

	could access the site from these larger areas of bushland in the surrounding landscape. The vegetation within the subject land is not recognised as a 'Regional Corridor' (OEH 2015). Within the locality, the vegetation within and connecting to Excelsior Creek south of the subject land constitutes the largest area of intact native vegetation and is likely part of a significant local corridor connecting local remnant vegetation patches. The subject land is well-connected to this area.
Karst, caves, crevices, cliffs and areas of geological significance	The subject land contains no other notable landscape features relevant to this assessment, including karst, caves, crevices, cliffs and areas of geological significance.
Areas of Outstanding Biodiversity Value (AOBV)	There are no AOBV as listed under the BC Act.

2.1 IBRA Bioregions and Subregions

Dominant landscape forms have been used to divide Australia into bioregions. The site is within the **NSW Sydney Basin IBRA bioregion** and **Cumberland IBRA Subregion** (Figure 6).

Figure 7: Location of site within the 'Cumberland' IBRA Subregion (red arrow)

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Figure 1: Site Details

Subject Site

NSW Cadastre GDA2020

Biodiversity Values 202309v16

Threatened species or communities with potential for serious and irreversible impacts

NSW Strahler Stream Order

1

NOTE: Development Plans have been geo-rectified from Aerial Imagery Not Survey Accurate on Map. For Illustration Purposes ONLY

Plans - DKO Architecture Proposed Masterplan No. SD 3.5.11 Rev. WIP-02 22/09/2023

Base Spatial Layers - NSW State Dept Open Source Accurate as of Sept 2023 GDA2020

DATE : 18/10/2023
Map Version: 1_1

Aerial Imagery: Nearmap 12/08/2023 GDA2020

Projected Coordinate System: GDA 2020 Zone 56

Scale: 1:1,200

Sub Region: Yengo

Sub Region: Pittwater

Sub Region: Cumberland

M2 Motorway

Milsoms Hill

Melia Court

STER PLAN Proposed Master Plan

5 Storey Apartment

5 Storey Apartment

5 Storey Apartment

2-3 Storey Apartment

3 Storey Apartment

4-3 Storey Apartment

2-3 Storey Terrace + Intergrated Basement

2-3 Storey Terrace + Intergrated Basement

2 Storey Terrace

2-3 Storey Terrace + Intergrated Basement

one-way private access road

LEGEND

Proposed Master Plan + retaining wall

DKO

Drawing Number SD3.5.11

Revision WIP-02

Hoop Pine Place

nearmap

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 20 40 60 80 100 200 Meters

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Figure 2: Landscape

IBRA Region: Sydney Basin
Sub Region: Cumberland

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 200 400 600 800 1,000 2,000 Meters

- Subject Site
- Subject Site 1500m buffer

IBRA7 Subregions

- IBRA7 Subregions

Mitchell Landscapes 3_1

landscapeName

- Pennant Hills Ridges
- Port Jackson Basin
- Hornsby Plateau

Biodiversity Values 202309v16

BOSET_Class

- Threatened species or communities with potential for serious and irreversible impacts
- Biodiverse riparian land

NSW Strahler Stream Order

- 1
- 2
- 3

Base Spatial Layers - NSW State Dept Open Source
Accurate as of Sept 2023 GDA2020

DATE : 18/10/2023
Map Version: 1_1

Aerial Imagery: NSW LPI 2019

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:14,000

2.2 Mitchell Landscape

Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000.

The subject site is within the 'Pennant Hills Ridges' Mitchell Landscape (Figure 8). This landscape region has an estimated cleared fraction of 0.2 and has 'over-cleared' land status.

Figure 8: Location of site within the 'Pennant Hills Ridges' Mitchell Landscape

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Figure 3: Native Vegetation

Subject Site

Subject Site 1500m buffer

NSW PCT Vegetation vC1_1 OEH DEC2022

Native Vegetation (103.8 Ha - 12.3% of 1500m Buffer)

Base Spatial Layers - NSW State Dept Open Source
Accurate as of Sept 2023 GDA2020

DATE : 18/10/2023
Map Version: 1_1

Aerial Imagery: NSW LPI Six Maps 2019

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:14,000

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 200 400 600 800 1,000 2,000 Meters

2.3 Native Vegetation Extent

Native vegetation cover is calculated as a percentage cover on the subject land and the surrounding 1,500 m buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, considering vegetation condition and extent.

According to BAM 2020 the percentage of native vegetation cover in the assessment area is assigned to one of the following classes: 0–10%; >10–30%; >30–70%; >70%. The native vegetation cover within the 1,500 m buffer for the subject land is 17 %. Accordingly, the subject land is assigned to the >10-30% percent native vegetation cover class.

The native vegetation cover is estimated at approximately 13%.

Review of aerial imagery (Nearmap 2023) and native vegetation mapping resources within the subject land and in the 1500 m buffer indicates that vegetation clearing has occurred historically within the subject land and across much of the surrounding locality.

It is estimated, from this mapping, that the native vegetation cover would be 12.3% (10-30% category) provided within the BDAR manual and this was used in the BAM Offsets calculator (Section 6).

Native vegetation in the locality consists mainly of remnant vegetation within the riparian corridors of Excelsior and Blue Gum Creek in West Pennant Hills. An assessment of native vegetation cover in the subject land and 1,500 m buffer is presented in Figure 9.


Fraser Ecological
Figure 3: Native Vegetation
Subject Site
Subject Site 1500m buffer
NSW PCT Vegetation vC1_1 OEH DEC2022
Native Vegetation (103.8 Ha - 12.3% of 1500m Buffer)
DATE : 18/10/2023
Map Version: 1_1
Aerial Imagery: NSW LPI Six Maps 2019
Projected Coordinate System: GDA 2020 Zone 56
Scale: 1:14,000
Although all care has been taken WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data.
Copyright © WiZarDTech Spatial
SITE: Melia Gardens, Glen Road, Castle Hill, NSW 2154
0 200 400 600 800 1,000 2,000 Meters

Figure 9: 1500m buffer area of the site

2.4 Patch Size

As defined in Section 4.3.2 of BAM 2020 “A patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems).” Patch size area was calculated for each vegetation zone and assigned to a class, being < 5 ha, 5–24 ha, 25–100 ha or ≥ 100 ha.

The patch size for the vegetation for all identified vegetation on-site is 100 hectares.

2.5 Wetland, Rivers, Streams and Estuaries

No significant wetlands, rivers, streams and estuaries are present within the subject land.

2.6 Connectivity Features

The biodiversity value of corridor networks is well known. Landscapes that retain more connections between patches of otherwise isolated areas of vegetation are more likely to maintain more numerous and more diverse populations of various plant and animal species (Lindenmayer and Fischer, 2006). Conversely, a lack of landscape connectivity can have a range of negative impacts on species populations (Lindenmayer and Fischer, 2006). It is thought that if existing remnants are left to persist without sufficient immigration to maintain genetic diversity, continued losses of biodiversity are certain (Parker *et al.* 2008).

The proposed development will not fragment bushland or significantly impact upon the corridor function of bushland on site as trees will be retained around the development site.

2.7 Areas of Geological Significance and Soil Hazard Features

Not present.

The site is located within the Glenorie soil landscape as depicted in Figure 5. The subject land is within the Glenorie soil landscape, which is described as undulating to rolling low hills on Wianamatta Group shales. Local relief is 50-80 m and slopes are 5–20 % with narrow ridges, hillcrests and valleys. The landscape is composed of extensively cleared tall open-forest (wet sclerophyll forests). The soils on slopes of Glenorie landscape are typically a topsoil of friable dark brown loam (friable loam, silt loam or silty clay loam) underlain by a subsoil of hard-setting brown clay loam (clay loam to fine sandy clay loam). Lower soil layers are whole-coloured, reddish-brown, strongly pedal clay and mottled grey plastic clay.

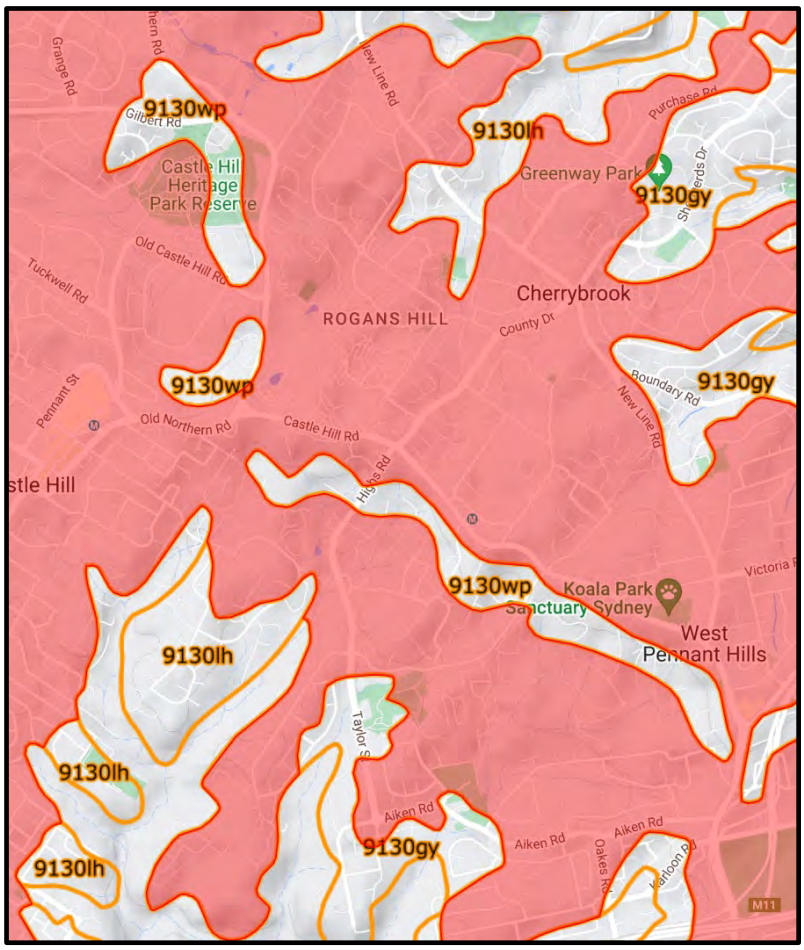


Figure 10 Soil landscapes

2.8 Areas of Outstanding Biodiversity Value

Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally.

No listed AOBV occur within the site or within a 1,500 m buffer around the site.

3 NATIVE VEGETATION & FAUNA HABITAT

3.1 Plant Community Types

Vegetation data collected via random meanders was compared with PCT descriptions provided in the BioNet Vegetation Classification (DPIE 2021b), particularly against the PCTs mapped within and around the subject land by Regional Mapping (OEH 2013, HSC 2016, NPWS 2002).

Where vegetation was highly degraded, 'best fit' PCTs were established based on the species composition in each patch and the most likely original PCT prior to site disturbance (Table 4). Vegetation types within the subject land were also assessed against identification criteria for State and Commonwealth listed Threatened Ecological Communities (TECs) (TSC 2021, DAWE 2021b).

It was determined that best fit PCT occurring on-site is PCT 3136 and a full description is provided in Table 4 and a vegetation map showing the extent of native vegetation (i.e. PCT 3136) within the subject land is presented in Figure 13.

The vegetation occurring on-site within a majority of the proposed development area is considered to be in poor to moderate condition (refer to Section 3.3.3 – Vegetation Integrity Scores).

Both Council vegetation mapping and the NSW Statewide Vegetation Mapping System identifies the site as containing Blue Gum High Forest (Figure 11 and Figure 12).

The extent of this vegetation community on-site was validated in the field surveys (Figure 13). The northern boundary of the site (Lot 1020 DP 876671 Melia Court) does **not** contain vegetation consistent with BGHF. It is dominated by introduced environmental weeds including *Ligustrum sinense* and *Ligustrum lucidum* with occasional occurrence of *Pittosporum undulatum* and *Glochidion ferdinandi*.

The central portion of the site is dominated introduced grasses including Kikuyu (*Pennisteum clandestinum*) with one isolated planted Brushbox *Lophostemon confertus* near the entrance of the site. Introduced weeds occurring in this same location include Giant Reed (*Arundo donax*), *Lantana camara* and Arum Lily (*Zantedeschia aethiopica*).

The eastern portion of the proposed development area includes isolated BGHF trees (*Eucalyptus saligna*) and regenerating shrubs - *Acacia implexa* with almost no other native shrub or groundcover species.

The southern-most portion of the proposed development area includes moderate condition BGHF dominated by *Eucalyptus saligna* trees heavily infested with introduced weedy vines such as *Ipomoea indica* (Morning Glory).

Other introduced species recorded on-site included:

- *Cinnamomum camphora*
- *Pennisetum clandestinum*

- *Ipomoea indica*
- *Bidens pilosa*
- *Lonicera japonica*
- *Zantedeschia aethiopica*
- *Cestrum parqui*
- *Ligustrum lucidum*
- *Ligustrum sinense*
- *Sonchus oleraceus*
- *Hypochaeris radicata*
- *Eharta erecta*
- *Rubus fruticosus*
- *Taraxicum officinale*
- *Solanum nigrum*

Table 4 Description of PCT 3136 - Blue Gum High Forest (BGHF)

Required Information	Description of information
Vegetation formation	Wet Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	North Coast Wet Sclerophyll Forests
Extent of PCT within subject land	2.5 ha across all 3 lots (not all of this is proposed for removal) Ares dominated by introduced weeds and introduced grasses in open cleared areas of the site do not from part of this PCT.
Extent in NSW	BGHF was originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 hectares remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 hectares. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas
Evidence used to identify PCT	**Vegetation maps:** • OEH (2013) maps the site as containing Blue Gum High Forest • Council maps the site as containing Blue Gum High Forest • NSW Statewide PCT mapping maps the site as containing Blue Gum High Forest The mapping projects incorrectly map the northern boundary of the site as containing BGHF – ground-truthing surveys revealed that it is dominated by introduced weeds. **Analysis of vegetated areas against VIS profile data:** A very tall to extremely tall sclerophyll open forest with a mesophyll shrub layer and a grassy and herbaceous ground layer found on clay rich shale soils in the high rainfall districts of Sydney's north shore and surrounding suburbs. It also occurs on small gully heads where downslope movement of shale soil lies above sandstone bedrock where outcrops may be present. It is found at elevations of 30-190 metres asl. This community has been extensively cleared across low slope ridgelines between Castle Hill and St Ives, with many remaining examples restricted to steeper slopes including in the suburbs of Ryde, Lane Cove and Willoughby. It grades into tall forests PCT 3262 on thinner shale soils that adjoin, or PCT 3176 downslope in sandstone gullies. This PCT occurs on a range of shale or shale-influenced substrates including gullies, ridgelines and slopes underlain by Wianamatta shales.

Plant species relied upon to identify PCT	**Typical plant species of BGHF:** The tree canopy very frequently includes a high cover of *Eucalyptus saligna*, commonly with *Eucalyptus pilularis* and occasionally *Syncarpia glomulifera*. The mid-stratum is layered, with a sparse cover of small trees that very frequently includes *Pittosporum undulatum* and occasionally *Elaeocarpus reticulatus*. There is often also at least one of a suite of tall Acacia species of which *Acacia parramattensis* is most frequent and the others are rarely occurring. The lower shrub layer also includes very frequently *Pittosporum undulatum*, commonly with *Breynia oblongifolia, Polyscias sambucifolia and Pittosporum revolutum*, occasionally with *Leucopogon juniperinus and Clerodendrum tomentosum*. The ground layer is variable in both composition and cover. It may be ferny, grassy or herbaceous and include a diversity of small mesic climbers depending on topographic situation and disturbance history. Species very frequently include *Microlaena stipoides, Entolasia marginata, Oplismenus aemulus, Pseuderanthemum variabile and Pandorea pandorana, commonly with Dichondra repens, Tylophora barbata and Adiantum aethiopicum, occasionally with Calochlaena dubia*. **BGHF indicative species recorded on-site:** • *Eucalyptus saligna* (Sydney Blue Gum) • *Acacia implexa* (Hickory Wattle) • *Pittosprum undulatum* (Sweet Pittosprum) • *Acacia parramattensis* • *Microlaena stipoides, Entolasia marginata, Oplismenus aemulus, Pseuderanthemum variabile*
TEC status	Blue Gum High Forest in the Sydney Basin Bioregion is listed as a Critically Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* and *Commonwealth EPBC Act 1999.*
Percent cleared value	90%

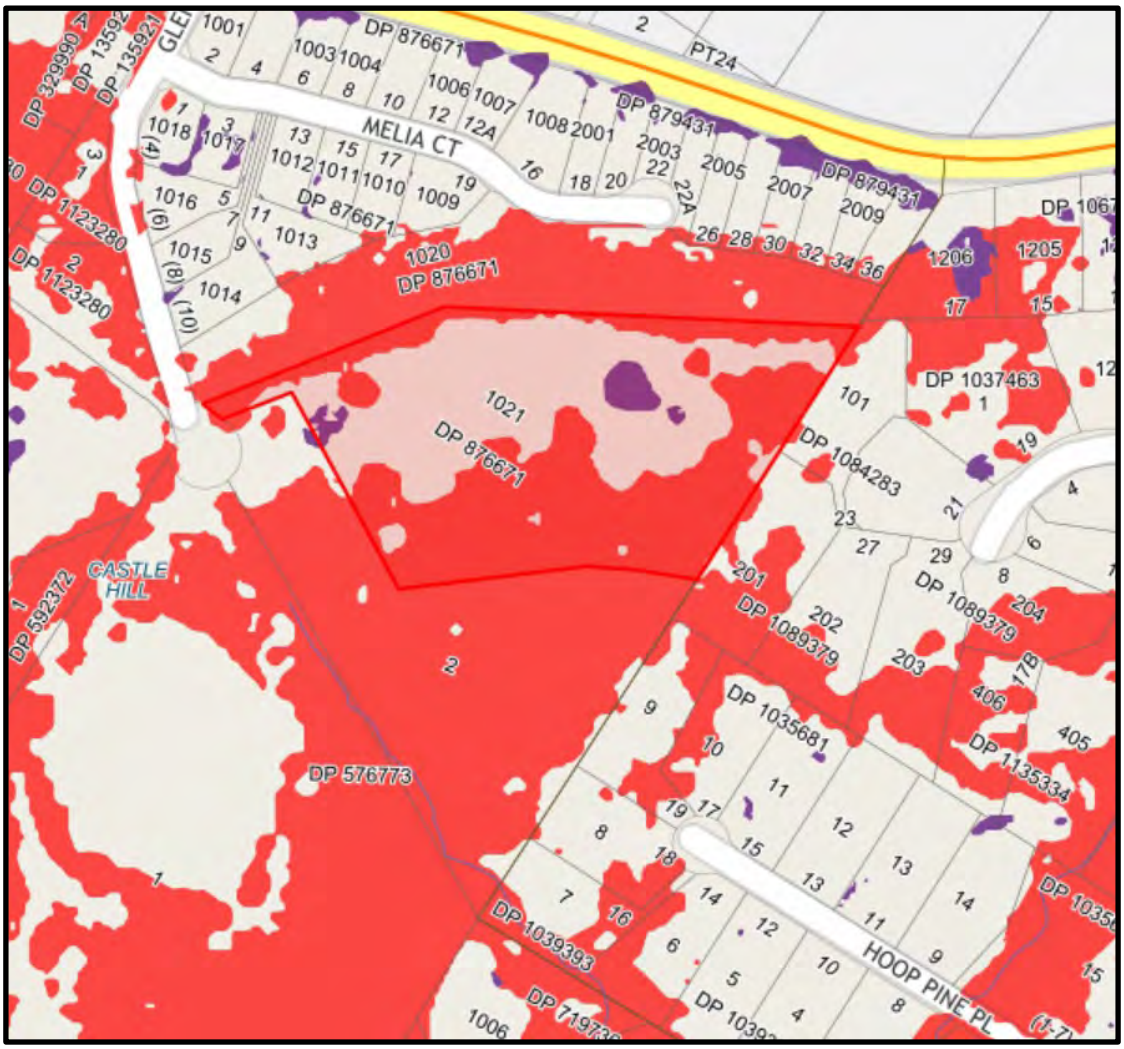


Figure 11 The Hills Shire Council vegetation mapping (red polygon = BGHF)

Figure 12: NSW State Vegetation Type Map (Department of Planning and Environment 2023) maps the site as containing '3136 – Blue Gum High Forest'

Fraser Ecological

Figure 4:
NSW PCT Vegetation

Subject Site

NSW Cadastre GDA2020

NSW PCT Vegetation vC1_1 OEH DEC2022

3136 -Blue Gum High Forest

Not native vegetation

NSW Strahler Stream Order

1

Base Spatial Layers - NSW State Dept Open Source
Accurate as of Sept 2023 GDA2020

DATE : 18/10/2023
Map Version: 1_1

Aerial Imagery: Nearmap 12/08/2023
GDA2020

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:1,200

Although all care has been taken WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data.

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 20 40 60 80 100 200 Meters

Figure 13 Field validated vegetation community extent (red outline)

3.1.1 Fauna habitat and species

The site for the proposed development predominantly occurs in existing cleared land or area with scattered remnant trees or highly weed infested remnant BGHF forest. The overall quality of fauna habitat is considered to be low.

However, the main development impact area provides some form of fauna habitat in the following forms:

- Seasonal foraging resources when eucalypts and other plants flower provide nectar and insect resources for mobile fauna including Grey-headed Flying Fox, possums, gliders, microchiropteran bats and a variety of woodland bird species (breeding habitat absent)
- Seasonal sources of seed on the forest floor and grasses and acacias for parrots
- Bird species likely to occur include parrots and nectivorous honeyeaters that forage and roost in the upper canopy of the trees. Blossoms from flowering canopy Myrtaceae would attract a variety of nectivores including possums, birds and threatened Grey-headed Flying Fox.

Large Forest Owls including threatened Powerful Owl (*Ninox strenua*) may occasionally visit the site depending upon the availability of prey items, however critical breeding resources (suitable hollow-bearing trees) were not observed on site.

The southern forested areas of the site may contain hollow-bearing trees that could not be visible as there were engulfed in environmental weedy vines (*Ipomoea indica* – Morning Glory). As a precautionary measure it has been assumed that habitat for these species maybe present.

Targeted surveys were undertaken for Dural Land Snail (*Pommerhelix duralensis*) as the author has previously recorded this species in the locality. This species was no detected in the immediate development impact area, however, this species is highly cryptic and some areas of the southern forest were not accessible due to weedy overgrowth. Therefore, we have assumed presence as a precautionary measure and created a species polygon for credit retirement in case it is indirectly impacted by the proposal.

Other mobile threatened fauna species, Grey-headed Flying-fox and a variety of microchiropteran bat species are likely to forage over the subject site, important maternity sites were not observed during surveys.

Two threatened species of fauna, the Powerful Owl and Grey-headed Flying-fox, were detected (vocalisations) during surveys of the subject land. The Powerful Owl was heard from the southern portion of the property boundary during targeted nocturnal surveys possibly on neighbouring lands. No potential nest trees of the Powerful Owl were identified but due to the large amount of overgrown vine impeding access, we have assume presence of this species. A species polygon, which encompasses the combined buffers for potential nest trees has been applied to this species.

The subject land may contain potential nest trees for the Gang-gang Cockatoo (in the southern forest overgrown with vines), which are trees with hollow openings that are over 10 cm in diameter and over 9 m above ground. The targeted species credit species surveys were undertaken outside of the optimal survey period of the Gang-gang Cockatoo and as such the species has been assumed present. A species polygon, which encompasses the combined buffers for potential nest trees has been applied to this species.

The Grey-headed Flying-fox was observed as a fly-over during nocturnal surveys. As no breeding habitat (i.e. camp) was detected for the Grey-headed Flying-fox a species polygon is not required for this species.

A summary of the fauna habitat features recorded on-site is provided in Table 5 (below).

The fauna species observed within the subject site are listed in Table 6 (following page).

Refer to Section 4.3 -4.5 for species polygons.

Table 5 Fauna habitat assessment

TOPOGRAPHY				
Flat ✓	Gentle ✓	Moderate	Steep	Drop-offs
VEGETATION STRUCTURE				
Closed Forest ✓	Open Forest ✓	Woodland	Heath	Grassland ✓
DISTURBANCE HISTORY				
Fire	Under-scrubbing ✓		Cut and fill works - Drainage culvert	
Tree clearing	Grazing		Mowing ✓	
SOIL LANDSCAPE				
DEPTH:	Deep ✓	Moderate ✓	Shallow	Skeletal
TYPE:	Clay ✓	Loam ✓	Sand	Organic
VALUE:	Surface foraging ✓	Sub-surface foraging	Denning/burrowing	
WATER RETENTION:	Well Drained ✓	Damp / Moist ✓	Water logged	Swamp / Soak
ROCK HABITAT				
CAVES:	Large	Small	Deep	Shallow
CREVICES:	Large	Small	Deep	Shallow
ESCARPMENTS:	Winter / late sunny aspects		Shaded winter / late aspects	
OUTCROPS:	High Surface Area Hides	Med. Surface Area Hides	Low Surface Area Hides	
SCATTERED / ISOLATED:	High Surface Area Hides	Med. Surface Area Hides	Low Surface Area Hides	
FEED RESOURCES				
FLOWERING TREES:	Eucalypts ✓	Corymbias	Melaleucas	
	Banksias	Acacias ✓		
SEEDING TREES:	Allocasuarinas	Conifers		
WINTER FLOWERING EUCALYPTS:	*C. maculata*	*E. crebra* ✓	*E. globoidea*	*E. sideroxylon*
	E. squamosa	*E. grandis*	*E. multicaulis*	*E. scias*
	E. robusta	*E. tereticornis*	*E. agglomerata*	*E. siderophloia*
FLOWERING PERIODS:	Autumn	Winter ✓	Spring	Summer ✓
OTHER:	Mistletoe	Figs / Fruit	Sap / Manna	Termites
FOLIAGE PROTECTION				
UPPER STRATA:	Dense	Moderate ✓	Sparse ✓	
MID STRATA:	Dense	Moderate ✓	Sparse	
PLANT / SHRUB LAYER:	Dense	Moderate	Sparse ✓	
GROUNDCOVERS:	Dense	Moderate ✓	Sparse ✓	
HOLLOWS / LOGS				
TREE HOLLOWS:	Large	Medium ✓	Small ✓	
TREE HOLLOW TYPES	Spouts / branch	Trunk	Broken Trunk ✓	Basal Cavities	Stags ✓
GROUND HOLLOWS:	Large	Medium	Small	
VEGETATION DEBRIS				
FALLEN TREES:	Large	Medium ✓	Small	
FALLEN BRANCHES:	Large	Medium ✓	Small	
LITTER:	Deep	Moderate ✓	Shallow	
HUMUS:	Deep	Moderate ✓	Shallow	
DRAINAGE CATCHMENT				
WATER BODIES	Wetland(s)	Soak(s)	Dam(s)	Drainage line(s)	Creek(s)	River(s)
RATE OF FLOW:	Still	Slow	Rapid	
CONSISTENCY:	Permanent	Perennial	Ephemeral	
RUNOFF SOURCE:	Urban / Industrial ✓	Parkland	Grazing ✓	Natural ✓
RIPARIAN HABITAT:	High quality	Moderate quality	Low quality	Poor quality
ARTIFICIAL HABITAT				
STRUCTURES:	Sheds	Infrastructure	Equipment	
SUB-SURFACE	Pipe / culvert(s)	Tunnel(s)	Shaft(s)	
FOREIGN MATERIALS:	Sheet	Pile / refuse		

Table 6 Fauna recorded on-site

Species Name	Common Name	Status	Observation Type
Cacatua galerita	Sulphur-crested Cockatoo	Native	Sighted
Cacatua sanguinea	Little Corella	Native	Sighted
Dacelo novaeguineae	Laughing Kookaburra	Native	Sighted
Gymnorhina tibicen	Australian Magpie	Native	Sighted
Manorina melanocephala	Noisy Miner	Native	Sighted
Ninox strenua	Powerful Owl	Vulnerable (BC Act)	Sighted
Petaurus breviceps	Sugar Glider	Native	Sighted
Platycercus elegans	Crimson Rosella	Native	Sighted
Platycercus eximius	Eastern Rosella	Native	Sighted
Podargus strigoides	Tawny Frogmouth	Native	Sighted
Pseudocheirus peregrinus	Common Ringtail Possum	Native	Sighted
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable (BC Act, EPBC Act)	Sighted
Ptilonorhynchus violaceus	Satin Bowerbird	Native	Sighted
Rattus rattus	Black Rat	Introduced	Sighted
Trichoglossus haematodus	Rainbow Lorikeet	Native	Sighted
Trichosurus vulpecula	Common Brushtail Possum	Native	Sighted
Vulpes vulpes	Fox	Introduced	Sighted
Felis catus	Cat	Introduced	Sighted
Lampropholis delicata	Garden Sun Skink	Native	Sighted
Litoria peronii	Peron's Tree Frog	Native	Heard

3.1.2 Plot-based Floristic Vegetation Surveys

BAM plot/ quadrat were undertaken in July 2023. Additional targeted flora surveys were undertaken for threatened species searches and PCT justification in September 2023.

Two 20 m x 20 m plot were sampled for the presence of flora species within each vegetation zone. The plot was carefully examined to identify all flora species present. Searches continued until it was confident that all flora species within a plot were detected. Data collected for each species included:

- Stratum and layers in which each species occurs
- Growth form for each species
- Scientific and common name for each species
- Percentage foliage cover (PFC) across the plot, of each species rooted in or overhanging the plot
- Abundance rating for each species

Targeted searches for threatened plants where access was possible. The southern portion of the site is highly overgrown with dense weedy vine and *Lantana camara*. Parallel traverses in areas of native vegetation in accordance with Surveying threatened plants and their habitats (DPIE 2020) were undertaken for a majority of the proposed development impact area.

Plant Community Types (PCTs) on the site were identified according to the NSW PCT classification described in the BioNet Vegetation Classification.

The vegetation condition of each PCT was defined as 'low' or 'moderate to good' based on the definitions presented in Table 7. BAM 2020 describes mapping of vegetation condition under "broad condition states" and suggests the following approach: "Disturbance to growth form groups for tree, shrub and ground cover or extent of exotics (or combinations of these) can be used to identify areas of similar condition".

Table 7 Vegetation Condition Definitions

Vegetation Condition	Definition#
Low	Vegetation contains a mosaic of planted and remnant native vegetation which resembles the PCT mapped on site. These areas have been historically cleared and contain specimens of native trees of PCT 3616 in low abundance. Structural characteristics are poor, species diversity is low and weeds and exotic species are common.
Moderate - Good	Vegetation retains the species complement and structural characteristics of the pre- European equivalent. Vegetation retains a native canopy and at least components of the native understorey. This condition class has minor to moderate understorey weed incursions in parts.

Note: vegetation condition classes are not defined in BAM 2020

The native plant community (PCT 3136) recorded on the subject land was incorporated into two vegetation zones based on broad 'low' and 'moderate to good' condition states, in accordance with Section 4.3.1 of BAM 2020.

The distribution and extent of vegetation zones within the subject land is displayed in Figure 8.

Four (4) vegetation zones were identified on site:

Vegetation Zone	Description	Impact type	Area m²	Area (ha)
Vegetation Zone A	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	Development Footprint	5750	0.58
Vegetation Zone A	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	Asset Protection Zone	841.2	0.08
Vegetation Zone B	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	Development Footprint	4215.9	0.42
Vegetation Zone B	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	Asset Protection Zone	4837.6	0.48
Vegetation Zone C*	Vegetation Zone C: Non-native vegetation - exotic grassland	Development Footprint	6743.9	0.67
Vegetation Zone C*	Vegetation Zone C: Non-native vegetation - exotic grassland	Asset Protection Zone	393.8	0.04
Vegetation Zone D*	Vegetation Zone D: Non-native vegetation - environmental weeds	Development Footprint	2411.8	0.24
Total			25194.2	2.51

**BAM Plots were not required for the non-native vegetation areas*

The number of BAM plots sampled in each vegetation zone was based on the requirements of BAM 2020, which are presented in Table 8.

Table 8 BAM Plots Required and Completed per Vegetation Zone

Vegetation Zone	Area impacted (ha)	BAM Category#	Plots Required	Plots Completed
PCT 3616_Poor_Veg Zone A	0.64	Less than 2ha	1	1
PCT 3616_Moderate_Veg Zone B	0.6	Less than 2ha	1	1

Based on Table 3 of BAM 2020

Plot data for Vegetation Zone A and B is provided in Appendix B.

The location of the BAM plots are provided within Figure 14.

Fraser Ecological

Figure 6: Surveyed vegetation zone map

Subject Site

Surveyed Vegetation Zones

- Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136
- Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136
- Vegetation Zone C: Non-native vegetation - exotic grassland
- Vegetation Zone D: Non-native vegetation - environmental weeds

Base Spatial Layers - NSW State Dept Open Source
Accurate as of Sept 2023 GDA2020

DATE : 25/10/2023
Map Version: 1_1

Aerial Imagery: Nearmap 12/08/2023
GDA2020

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:1,200

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 20 40 60 80 100 200 Meters

Glen Road

Melia Court

Hoop Pine Place

nearmap

151.0194° 151.02° 151.0205° 151.0211° 151.0216° 151.0222° 151.0227° 151.0233° 151.0238°

-33.7323° -33.7328° -33.7334° -33.7339° -33.7345° -33.735°

Figure 14: Location of BAM Plots (red rectangle) and 400sqm quadrat (blue square)

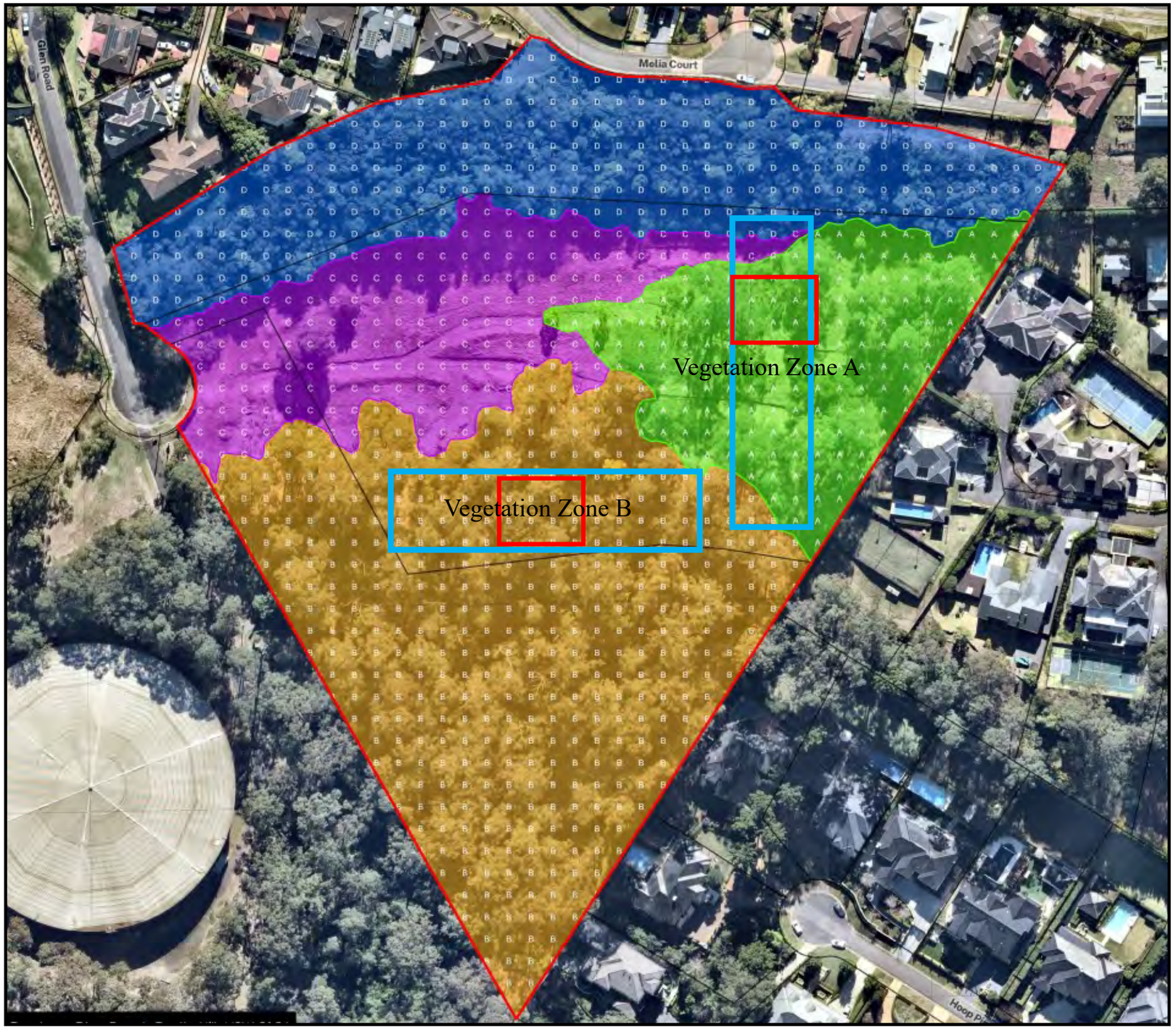


Figure 14: Location of BAM Plots (blue rectangle) and 400sqm quadrat (red square)

Photograph 1 Entrance to the site showing introduced environmental/ non-native vegetation – view east - Vegetation Zone C: Non-native vegetation - exotic grassland

Photograph 2 Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136 - view west

Photograph 3: Vegetation Zone D: Non-native vegetation - environmental weeds in background (predominantly *Ligustrum* spp.)

Photograph 4: Eastern extent of proposed development area – Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136

Photograph 5: Eastern boundary of the site

Photograph 6: Approximate location of proposed bioretention basins

Photograph 1: Vegetation Zone A - BAM Plot midline (view north)

Photograph 2: Vegetation Zone A - BAM Plot midline (view south)

Photograph 3: Vegetation Zone B - BAM Plot midline (view north-east)

Photograph 4: Vegetation Zone B - BAM Plot midline (view south-west)

3.2 Vegetation Integrity Assessment

3.2.1 Vegetation Integrity Scores

Each vegetation zone identified on the site has been surveyed to obtain a quantitative measure for each zone, of the composition, structure and function attributes listed in Table 3 of the BAM. These attributes are listed below:

- Growth form groups used to assess composition and structure:
    - Tree
    - Shrub
    - Grass and grass like
    - Forb
    - Fern
    - Other
- Attributes used to assess function:
    - Number of large trees
    - Tree regeneration
    - Tree stem size class
    - Total length of fallen logs
    - Litter cover
    - High threat exotic vegetation cover
    - Hollow-bearing trees

Plot-base surveys were conducted, in accordance with s.5.3.4 of the BAM, by an ecologist (Alex Fraser and Jesse McIvor). Survey plots were established around a central 50 m transect and included:

- One 400 m² (20 m x 20 m) plot to assess the composition and structure attributes listed above.
- One 1000 m² (20 m x 50 m) plot to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.
- Five 1 m² sub-plots to assess average litter cover (and other optional groundcover components).

Refer to Figure 15 for plot locations. Plot data is provided in Appendix B. Table 3-2 details the vegetation integrity scores for each vegetation zone.

Table 3-9: Vegetation Integrity Scores

PCT	Vegetation Zone	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3136	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	0.64	2	27.7	26.2	11.3
PCT 3136	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	0.9	4.9	35.7	40.6	19.2
Unclassified/ non conformant with a PCT	Vegetation Zone C: Non-native vegetation - exotic grassland	0.71	n/a	n/a	n/a	n/a
Unclassified/ non conformant with a PCT	Vegetation Zone D: Non-native vegetation - exotic grassland	0.24	n/a	n/a	n/a	n/a

4 THREATENED SPECIES

4.1 Ecosystem Credit Species

Ecosystem credit species are those where the likelihood of occurrence of the species or elements of the species' habitat, can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. The Threatened Biodiversity Data Collection (TBCD) has identified several ecosystem credit species as requiring assessment as shown on the following page.

Table 10 Ecosystem credit species to be considered (threatened species reliably predicted to use the site)

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	*Ninox connivens*	3136-Blue Gum High Forest
Black Bittern	*Ixobrychus flavicollis*	3136-Blue Gum High Forest
Black-necked Stork	*Ephippiorhynchus asiaticus*	3136-Blue Gum High Forest
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	3136-Blue Gum High Forest
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	3136-Blue Gum High Forest
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	3136-Blue Gum High Forest
Flame Robin	*Petroica phoenicea*	3136-Blue Gum High Forest
Gang-gang Cockatoo	*Callocephalon fimbriatum*	3136-Blue Gum High Forest
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	3136-Blue Gum High Forest
Grey-headed Flying-fox	*Pteropus poliocephalus*	3136-Blue Gum High Forest
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	3136-Blue Gum High Forest
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	3136-Blue Gum High Forest
Little Bent-winged Bat	*Miniopterus australis*	3136-Blue Gum High Forest
Little Lorikeet	*Glossopsitta pusilla*	3136-Blue Gum High Forest
Masked Owl	*Tyto novaehollandiae*	3136-Blue Gum High Forest
Painted Honeyeater	*Grantiella picta*	3136-Blue Gum High Forest
Powerful Owl	*Ninox strenua*	3136-Blue Gum High Forest
Regent Honeyeater	*Anthochaera phrygia*	3136-Blue Gum High Forest
Rosenberg's Goanna	*Varanus rosenbergi*	3136-Blue Gum High Forest

Common Name	Scientific Name	Vegetation Types(s)
Speckled Warbler	*Chthonicola sagittata*	3136-Blue Gum High Forest
Spotted-tailed Quoll	*Dasyurus maculatus*	3136-Blue Gum High Forest
Square-tailed Kite	*Lophoictinia isura*	3136-Blue Gum High Forest
Superb Fruit-Dove	*Ptilinopus superbus*	3136-Blue Gum High Forest
Swift Parrot	*Lathamus discolor*	3136-Blue Gum High Forest
Varied Sittella	*Daphoenositta chrysoptera*	3136-Blue Gum High Forest
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	3136-Blue Gum High Forest
White-throated Needletail	*Hirundapus caudacutus*	3136-Blue Gum High Forest
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	3136-Blue Gum High Forest

4.2 Species Credit Species (Candidate Species)

Species credit species (or candidate species) are those where the likelihood of occurrence of the species or elements of suitable habitat for the species, cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey. The TBDC has identified several candidate species as requiring assessment as provided on the following page (refer to candidate species credit report).

In accordance with S.6.5.1.1. a species survey must be undertaken for all species credit species identified as likely to occur on the site.

Refer to Table 11 on the following pages.

Table 11 Candidate species assessed

Table 11 Species Credit Species Assessment

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Acacia bynoeana Bynoe's Wattle May be surveyed at any time of year.	Grows in heath or dry sclerophyll forest on sandy soils. Prefers open, sometimes slightly disturbed sites such as trail margins, road edges, and in recently burnt open patches.	Not within typical vegetation type or soils. Not detected on subject land.	N	N
Acacia prominens Gosford Wattle population in Hurstville and Kogarah LGAs May be surveyed at any time of year.	Occurs at a few sites along the railway line at Penhurst, at Carss Bush Park, Carss Park and there is an unconfirmed siting at Oatley Park, Oatley. Grows in open situations on clayey or sandy soils.	Not within typical distribution or soils. No records within 5 km. Not detected on subject land.	N	N
Acacia pubescens Downy Wattle May be surveyed at any time of year.	Typical distribution around Bankstown-Fairfield-Rookwood and Pitt Town. Occurs on alluviums, shales and at shale/sandstone intergrade. Soils are characteristically gravely, often with ironstone. Found in open woodland and forest, in a variety of PCTs, including CRCIF, SGTF and CPW.	Not within typical distribution, vegetation type or soils. Not recorded on subject land.	N	N
Anthochaera phrygia Regent Honeyeater It does not require survey as important habitat has been mapped.	A duel credit species, with a patch size <5 ha and <10% surrounding native vegetation requirement. In NSW the species is confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Habitat requirements are mapped breeding areas.	Habitat constraints not met. No mapped breeding areas on the subject land.	N	N
Burhinus grallarius Bush Stone-curlew May be surveyed at any time of year.	A species credit species with a patch size <5 ha and 11-30% surrounding native vegetation requirement. Inhabits lowland grassy woodland and open forest, Casuarina and Melaleuca woodlands, saltmarsh and mangroves. Requires a low, sparse groundcover, some fallen timber and leaf litter, and a general lack of a shrubby understory. Habitat requirements are fallen/standing dead timber including logs.	The vegetation on the subject land is shrubby and open areas are disturbed without suitable fallen/ standing dead timbers. No BioNet records within 5 km.	N	N
Caladenia tessellata Thick Lip Spider Orchid Specific survey months, being September (coastal) and October (ranges).	Occurs from Central Coast to southern Victoria, with only old records in the Sydney area. Generally, grows in grassy dry sclerophyll woodland on clay loam or sandy soils.	Not within typical vegetation type or soils. No BioNet records within 5 km.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Callocephalon fimbriatum Gang-gang Cockatoo Specific survey months, being October to January.	A dual credit species with <5 ha patch size and 11-30% surrounding native vegetation requirement. Favours old growth forest and woodland attributes for nesting and roosting. Nests are in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. Habitat requirements are Eucalyptus tree species with hollows >9 cm diameter.	NA	Y	N
Calyptorhynchus lathami Glossy Black-Cockatoo Specific survey months, being April to August.	A dual credit species with <5 ha patch size and <10% surrounding native vegetation requirement. Feeds almost exclusively on the seeds of *Allocasuarina*/ *Casuarina* spp. Prefers woodland and open forests, near Sheoak. Roost in leafy canopy trees, preferably eucalypts, usually <1 km from feeding site. Habitat requirements for breeding are living or dead trees with hollows >15 cm diameter and >5 cm above ground.	NA	N	N
Camarophyllopsis kearneyi Specific survey months, being May and June, and within 7-10 days after at least 40 mm of rain over 2 weeks.	Type locality, Lane Cove Bushland Park. Habitat constraints are creeks, drainage lines, ephemeral wet areas, swamps, waterbodies (or within 500 m of these features).	NA	N	N
Cercartetus nanus Eastern Pygmy-possum Specific survey months, being October to March.	A species credit species with a <5 ha patch size and 11-30% surrounding native vegetation requirement. Found in a broad range of habitats, but woodlands and heath are preferred, except in NE NSW where they prefer rainforest. Shelter in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, (eg grass-tree skirts). Tree hollows are favoured for nesting.	No preferred woodland or heath habitat. No BioNet records within 5 km.	N	N
Chalinolobus dwyeri Large-eared Pied Bat Specific survey months, being November to January.	A species credit species with a <5 ha patch size and 11-30% surrounding native vegetation requirement. It has a specific cliff habitat requirement, being within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Habitat constraints not met. No cliff and cave habitat on the subject land or within 2 km of the subject land.	N	N
Epacris purpurascens var. *purpurascens* Specific survey months, being September to October when key flowering occurs.	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence. Use flowers to distinguish the species from *E. pulchella* and *Woollsia pungens*.	Suitable habitat in PCT 1281 mod-good, but Epacris leaves are distinctive, and potential plants were not detected.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Grevillea parviflora ssp. *parviflora* Small-flower Grevillea Specific survey months being August to November, when producing white spider- like flowers.	Sporadically distributed throughout the Sydney Basin (Picton to Hunter). Sydney region occurrences are usually in Shale Sandstone Transition Forest on tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park.	Not within typical vegetation type or soils. No records within 5 km.	N	N
Grevillea parviflora ssp. *supplicans* Specific survey months, being August to November, when producing white or pink/purple grevillea-like flowers.	Has a very restricted known distribution (approximately 8 by 10 km) and is confined to the northwest of Sydney near Arcadia and the Maroota–Marramarra Creek area. Occurs in heathy woodland associations on skeletal sandy soils over massive sandstones. Suggested association with yellow clays with periodically impeded drainage.	Geographic limitations not met. Also, not within typical vegetation types or soils. No records within 5 km.	N	N
Gyrostemon thesioides May be surveyed at any time of year, within 3-4 years of fire.	Within NSW, has only ever been recorded at three sites, to the west of Sydney, near the Colo, Georges and Nepean Rivers. Grows on hillsides and riverbanks and may be restricted to fine sandy soils. A fire-opportunist, with recruitment occurring from a soil stored seed bank following fire.	Habitat constrains not met. Not within typical distribution, landscape position or soils. No records within 5 km.	N	N
Hibbertia puberula Specific survey months, being October to December, when producing yellow flowers in groups of 1-3.	Widespread but uncommon, extending from Wollemi National Park south to Morton National Park and the south coast near Nowra. Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodlands, although heaths are also occupied and one subspecies favours upland swamp.	Not within typical vegetation types or soils. No records within 5 km.	N	N
Hibbertia superans Specific survey months, being July to December when in flower, particularly after disturbance.	Occurs from Baulkham Hills to South Maroota in the northern outskirts of Sydney. The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	Not within typical landscape position or vegetation types.	N	N
Hieraaetus morphnoides Little Eagle It has specific survey months, being August to October. This is to detect breeding, where a large stick nest is found.	A dual credit species with <5 ha patch size and 11-30% surrounding native vegetation requirement. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring. Habitat requirements are nest trees – live (or occasionally dead) large old trees within vegetation.	Habitat constraints not met. No suitable nests located on subject land.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Hygrocybe species (*H. anomala* var *ianthinomarginata*, *H. aurantipes*, *H. austropratensis*, *H. collucera*, *H. griseoramosa*, *H. lanecovensis*, *H. reesiae*, *H. rubronivea*). Specific survey months, being May and June (*H. collucera* June only), and within 7-10 days after at least 40 mm of rain over 2 weeks.	Type locality, Lane Cove Bushland Park. Other records of *H. rubronivea* from Royal and Blue Mountains NPs. Occur in gallery warm temperate forests dominated by *Acmena smithii*, *Backhousia myrtifolia*, *Glochidion ferdinandi* and *Pittosporum undulatum*. Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Habitat constraints are creeks, drainage lines, ephemeral wet areas, swamps, waterbodies (or within 500 m of these features).	Not within typical distribution, vegetation types and soils. No BioNet records within 5 km. Not detected on subject land.	N	N
Lathamus discolor Swift Parrot It does not require survey as areas of important habitat have been mapped.	A dual credit species with <5 ha patch size and <10% surrounding native vegetation requirement. A migratory species that travels to the mainland from March to October, and breeds in Tasmania from September to January. Habitat requirements are as per mapped areas.	Habitat constraints not met. No mapped breeding areas on the subject land.	N	N
Litoria aurea Green and Golden Bell Frog It has specific survey months, being November to March.	A species credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Inhabits marshes, dams and stream-sides, particularly those containing *Typha* spp. or *Eleocharis* spp. Optimum habitat includes waterbodies that are unshaded, free of predatory fish, have a grassy area nearby and diurnal sheltering sites. Habitat requirements include semi-permanent/ephemeral wet areas within 1 km of swamps/waterbodies.	Habitat constraints not met. No permanent open water near or within the subject land. Hostile environment between subject land and Pyes Creek.	N	N
Lophoictinia isura Square-tailed Kite Specific survey months, being September to January. This is to detect breeding, where a large stick nest is found.	A dual credit species with <5 ha patch size that has. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a preference for timbered watercourses. Habitat requirement is the presence of a nest tree.	Habitat constraints not met. No suitable nests located on subject land.	N	N
Meridolum corneovirens Cumberland Plain Land Snail May be surveyed all year round	A species credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Restricted to the Cumberland Plain where it primarily inhabits Cumberland Plain Woodland, but also Shale Gravel Transition Forests, Castlereagh Swamp Woodland and the margins of River-flat Eucalypt Forest. The species is reliant on a good cover of coarse woody debris and uses soil cracks for shelter.	Not within typical distribution or vegetation types.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Miniopterus australis Little Bent-winged Bat Specific survey months, being December to February	A dual credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Only one maternity cave known in NSW, at Willi Willi, near Kempsey. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day. Habitat requirements are caves, tunnels, old mine culverts or other structures suspected of breeding with >500 individuals.	Habitat constraints not met. Habitat assessment of buildings/ hollows found these are not suspected breeding habitat.	N	N
Miniopterus orianae oceanensis Large Bent-winged Bat Specific survey months, being December to February.	A dual credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Primary roosting habitat comprises caves, but they also use derelict mines, storm water tunnels, buildings and other man-made structures. At other times of the year, populations disperse within about 300 km range of maternity caves. Habitat requirements are caves, tunnels, old mine culverts or other structures suspected of breeding with >500 individuals.	Habitat constraints not met. Habitat assessment of buildings/ hollows found these are not suspected breeding habitat.	N	N
Myotis Macropus Southern Myotis Specific survey months, being October to March.	A species credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Species is dependent on pools/ stretches of water 3 m or wider including rivers, creeks, billabongs, lagoons, dams and other waterbodies for foraging. Habitat within 200 m of waterways is used for breeding and roosting. Habitat requirements include hollow-bearing trees or other structures (bridges, caves or artificial structures) within 200 m of waterbody (including rivers, creeks, billabongs, lagoons, dams etc…).	NA	Y	N
Ninox connivens Barking Owl Specific survey months, being May to December. This to detect breeding, where a suitable nesting hollow is found.	A dual credit species with a <5 ha patch size and 11-30% surrounding native vegetation requirement. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. Breeding habitat constraints are living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. Territorial pairs respond strongly to recordings of Barking Owl calls from up to 6 km away.	NA	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Ninox strenua Powerful Owl Specific survey months, being May to August. This to detect breeding, where a suitable nesting hollow is found.	A dual credit species with a <5 ha patch size and 11-30% surrounding native vegetation requirement. Solitary and sedentary species. Inhabits a range of habitats from woodland and open sclerophyll forest to tall open wet forest and rainforest. Prefers large tracts of vegetation. Roosts by day in dense vegetation comprising species such as *S. glomulifera* and *A. littoralis*. Nests in large tree hollows (> 0.5 m deep), in large eucalypts (DBH 80-240 cm) that are at least 150 years old. Pairs have high fidelity to a small number of hollow-bearing nest trees and defend a large home range of 400 - 1,450 ha. Breeding habitat requirements are living or dead trees with hollow >20 cm diameter.	NA	Y	N
Persoonia hirsuta Hairy Geebung May be surveyed all year round	The distribution of the species is scattered around Sydney, east to the Blue Mountains and from Singleton in the north to Bargo in the south. The species is found in dry sclerophyll open forest on sandy soils.	Not within typical vegetation type or soils. Not detected on subject land.	N	N
Petaurus norfolcensis Squirrel Glider May be surveyed all year round, but sites with bipinnate acacia, autumn winter flowering trees *(E. robusta*) and shrubs (*Banksia* spp.) should be surveyed March to August.	A species credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Inhabits Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (ie no more than 50 m apart).	Not within typical vegetation type. Site lacks heathy/ Bloodwood foraging resources. Not detected on subject land during spotlighting.	N	N
Phascolarctos cinereus Koala May be surveyed all year round	A dual credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Important habitat is defined by the density of koalas and quality of habitat determined by on-site survey. Inhabits eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Habitat requirements include areas identified via survey as important habitat.	Habitat constraints not met. Whilst SEPP *Koala Habitat Protection 2019* feed tree species are present, it is unlikely that the subject land would be used by Koalas due to lack of connectivity and hostile crossing points.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
Pimelea curviflora var. *curviflora* Specific survey months, being October to March, with recommendation to survey at least twice during flowering.	The species is confined to the coastal area of the Sydney and Illawarra regions of NSW. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Not within typical landscape position, vegetation types or soils.	N	N
Pomaderris prunifolia population in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas. Specific survey months being September, when in flower.	Known from only three sites within the listed LGAs, at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere it occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest (CRCIF) on shale soils.	Not within typical distribution, vegetation types or soils. No plants with suspected foliage detected.	N	N
Pommerhelix duralensis Dural Land Snail May be surveyed all year round.	A species credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark and does not burrow nor climb. Habitat requirements include areas with rocks, logs, litter and bark or within 50 m of these features.	NA	Y	N
Pteropus poliocephalus *Grey-headed Flying-fox* *Specific survey months, being October to December. This is to detected breeding within a known camp.*	A dual credit species with a <5 ha patch size and <10% surrounding native vegetation requirement. Inhabits subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Habitat requirements are breeding camps.	Habitat constraints not met. No camp or evidence of a camp was detected on the subject land.	N	N
Rhodamnia rubescens *Scrub Turpentine* *May be surveyed all year round*	Occurs in coastal districts north from Batemans Bay in NSW to areas inland of Bundaberg in QLD. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Not within typical soils. Not detected on subject land.	N	N
Syzygium paniculatum *Magenta Lilly Pilly* *Specific survey months, being April to June, when fruiting. Samples need to be verified by RBG to detect hybridisation.*	The species occurs in a narrow coastal strip from Bulahdelah to Conjola State Forest. Rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas, often in remnant littoral or gallery rainforests. Naturally occurring plants generally produce low numbers of	Not typical vegetation type or soils. Not detected on subject land. Nearby records are probably planted.	N	N

Species Name and Survey Requirements (DPIE 2021a)	Habitat Requirements (DPIE 2021a)	Justification for Exclusion	Assumed Present (Y/N)	Targeted Survey Required (Y/N)
	fruit, compared to cultivated individuals and offspring.			
Tetratheca glandulosa *Specific survey months, being August to November, when flowering.*	Restricted to LGAs: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. Associated with shale-sandstone transition in Lucas Heights, Gymea, Lambert and Faulconbridge soil landscapes. Typically occurs in Sydney Sandstone Ridgetop Woodland on ridgetops and upper slopes with shallow yellow, clayey/sandy loam soil often with stony lateritic fragments.	Not within typical vegetation types or soils.	N	N
Tyto novaehollandiae *Masked Owl* *Specific survey months, being May to August to detect breeding, where a suitable nesting hollow is found.*	A dual credit species with a <5 ha patch size and 11-30% surrounding native vegetation requirement. Inhabits dry eucalypt forest and woodland. Roosts and breeds in large (>20cm) hollows in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Habitat requirements are presence of a living or dead tree with hollow >20cm diameter.	NA	N	N
Wahlenbergia multicaulis *Tadgell's Bluebell population in the Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield LGAs* *May be surveyed all year round, but requires survey 2 months after 20 mm or more rainfall event, when local reference site (Rookwood cemetery) is also in flower.*	There are 13 known sites, two of which are in northern Sydney (Thornleigh and Mt Ku-ring-gai) and remainder in western Sydney. Sites in Hornsby LGA are on the 'Hawkesbury' soil landscape. Typically found in damp, disturbed sites in a variety of habitats including forests, woodland, scrub, grassland at edges of watercourses and wetlands. In Hornsby LGA it occurs in or adjacent to sandstone gully forest.	Not within typical vegetation types or soils. No BioNet records within 5 km. Not detected on subject land.	N	N

4.3 Powerful Owl Species Polygon

The current TBDC survey and species polygon requirements for the Powerful Owl are as follows:

The species can breed and forage in very small patches of vegetation, although this is hugely variable across their range. Where any nest tree(s) for which high fidelity is known to occur on site (e.g. known from existing data, studies or other documented evidence), a species polygon providing a circular buffer with a 100 m RADIUS should be drawn around the known nest tree(s). In addition, or where there are no known nest trees on site, assessors should apply the following process:

1. Look for SIGNS OF BREEDING on site as follows; suitable habitat AND (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest. Note that this species does not respond as well to call-play-back and could require stagwatching and other evidence of nesting.
2. Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees are living or dead trees with hollows greater than 20 cm diameter.
3. Where potential nest trees are identified on site, night monitoring at the identified potential nest locations for a minimum of 2 nights should be undertaken to detect the presence of any owl of this species using a potential nest tree or demonstrating behaviour focussed on a potential nest tree (e.g. investigating the hollow or roosting within 10 m). DPE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake species surveys using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).
4. If monitoring of potential nest trees detects this owl species using, or demonstrating behaviour focussed on the trees (e.g. investigation of the hollow or roosting within 10 m) on site, the species polygons should be drawn around those trees (i.e the identified potential nest trees where any owl of this species is observed using, or focussing behaviour around the tree). The species polygons should be circular in shape and must include a buffer RADIUS of 100 m around each tree. The purpose of the buffer is to minimise disturbance/avoid clearing, for a development application, or to conserve and improve habitat, for a biodiversity stewardship agreement, within the area essential for breeding. This includes habitat suitable for male roosts, feeding/grooming perches and fledgling requirements. It does not account for foraging habitat. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.

Large Forest Owls including Powerful Owl (*Ninox strenua*) may occasionally visit the site depending upon the availability of prey items, however critical breeding resources (suitable hollow-bearing trees) were not observed on site.

The southern forested areas of the site may contain hollow-bearing trees that could not be visible as there were engulfed in environmental weedy vines (*Ipomoea indica* – Morning Glory). As a precautionary measure it has been assumed that habitat for these species maybe present.

As a precautionary measure we have assumed the whole site contains potential habitat for this species as the species polygon.

4.4 Gang-Gang Cockatoo Species Polygon

The current TBDC survey and species polygon requirements for the Gang-Gang Cockatoo are as follows:

1. Assessors should look for SIGNS OF BREEDING on site as follows; (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. If breeding is presumed present, progress to Step 3.
2. Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees are forest and woodland eucalypts containing hollows that are; (i) at least 3 m above the ground and (ii) with hollow diameter of 7 cm or larger.
3. Where potential nest trees are identified on site, monitor for this species during the breeding season (October to January) to confirm the presence of any ACTUAL NEST TREES on site. DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements).
4. If actual nest trees are confirmed on site, then the species polygons are to be drawn around those actual nest trees (i.e. trees that birds of the species are known to have used for nesting). The species polygons should be circular in shape and must include a buffer RADIUS of 200 m around each actual nest tree. The purpose of the buffer is to identify the essential area for breeding and minimise disturbance/avoid clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.

The southern forested areas of the site may contain hollow-bearing trees that could not be visible as there were engulfed in environmental weedy vines (*Ipomoea indica* – Morning Glory). As a precautionary measure it has been assumed that breeding habitat for this species maybe present.

As a precautionary measure we have assumed the whole site contains potential habitat for this species as the species polygon.

4.5 Dural Land Snail Species Polygon

No species polygon information is available within the TBDC profile for this species other than the following relevant information:

- The species is likely to persist in a small clump (3 trees) of paddock trees as long as bark and/or leaf litter is present. This is potentially two species, split by the Hawkesbury River, taxonomic research required. Predation by rats and mice are a key threat, and are more prevalent given the presence of horses etc.

As a precautionary measure we have assumed the whole site contains potential habitat for this species as the species polygon.

Targeted surveys were undertaken for Dural Land Snail (*Pommerhelix duralensis*) as the author has previously recorded this species in the locality.

This species was not detected in the immediate development impact area, however, this species is highly cryptic and some areas of the southern forest were not accessible due to weedy overgrowth. Therefore, we have assumed presence as a precautionary measure and created a species polygon for credit retirement in case it is indirectly impacted by the proposal.

Figure 15 Species polygons

Fraser Ecological

Figure 8: Species Polygons

Subject Site

Species Polygons

- Dural Land Snail (Pommerhelix duralensis)
- Gang Gang Cockatoo (Callocephalon fimbriatum)
- Powerful Owl (Ninox strenua)

Base Spatial Layers - NSW State Dept Open Source
Accurate as of Sept 2023 GDA2020

DATE : 26/10/2023
Map Version: 1_1

Aerial Imagery: Nearmap 12/08/2023
GDA2020

Projected Coordinate System:
GDA 2020 Zone 56

Scale: 1:1,200

Although all care has been taken WiZarDTech accepts no responsibility from the use or inaccuracies of this map and spatial data.

Glen Road

Melia Court

Hoop Pine Place

nearmap

SITE: Melia Gardens. Glen Road, Castle Hill, NSW 2154

0 20 40 60 80 100 200 Meters

4.6 Description of Impacts

4.6.1 Potential Direct Impacts

Vegetation and habitat removal

The Arborist Impact Assessment Report (AIA) prepared by H20 Consulting identifies that There are 209 trees located within the proposal footprint, which will require removal (Table 4 & Figure 3 of the AIA).

This includes 69 BGHF trees. The AIA states that 72 High Retention Value trees occur within the proposal footprint and will require removal to allow for construction works.

The total area of the site is 4.5 hectares of which approximately 1ha comprises of moderate condition BGHF proposed for removal (Figure 11 – Vegetation Zone B). It still contains a high level of weed invasion.

The total area of introduced environmental weeds or highly degraded BGHF comprises of approximately 1.5ha of the proposed development footprint (including APZ and internal roads). This includes Vegetation Zones A, C and D.

The total remaining approximate area of 0.8ha of moderate condition BGHF vegetation (outside proposed APZs) is to be protected and enhanced via the proposed Vegetation Management Plan (prepared by Fraser Ecological Consulting - refer to Figure 12).

Figure 11 shows the location impacted vegetation zones.

Table 7 shows a summary of the area (ha) of vegetation of each impacted vegetation zone.

Table 12 Impacted Vegetation Zones

Development Area	Vegetation Zone	LABEL	Area m2	Area Ha
Development Footprint	Vegetation Zone A	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	5750	0.58
Asset Protection Zone IPA	Vegetation Zone A	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	593.8	0.06
Asset Protection Zone OPA	Vegetation Zone A	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	74.9	0.01
Development Footprint	Vegetation Zone B	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	4215.9	0.42
Asset Protection Zone IPA	Vegetation Zone B	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	4712	0.47
Asset Protection Zone OPA	Vegetation Zone B	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	3996.9	0.4
Development Footprint	Vegetation Zone C	Vegetation Zone C: Non-native vegetation - exotic grassland	6743.9	0.67
Asset Protection Zone IPA	Vegetation Zone C	Vegetation Zone C: Non-native vegetation - exotic grassland	378.2	0.04
Asset Protection Zone OPA	Vegetation Zone C	Vegetation Zone C: Non-native vegetation - exotic grassland	172.9	0.02
Development Footprint	Vegetation Zone D	Vegetation Zone D: Non-native vegetation - environmental weeds	2411.8	0.24
		Total	29050.3	2.91

Figure 16 Impacted Vegetation Zones

Fraser Ecological

Figure 7: Impacted Vegetation Zone

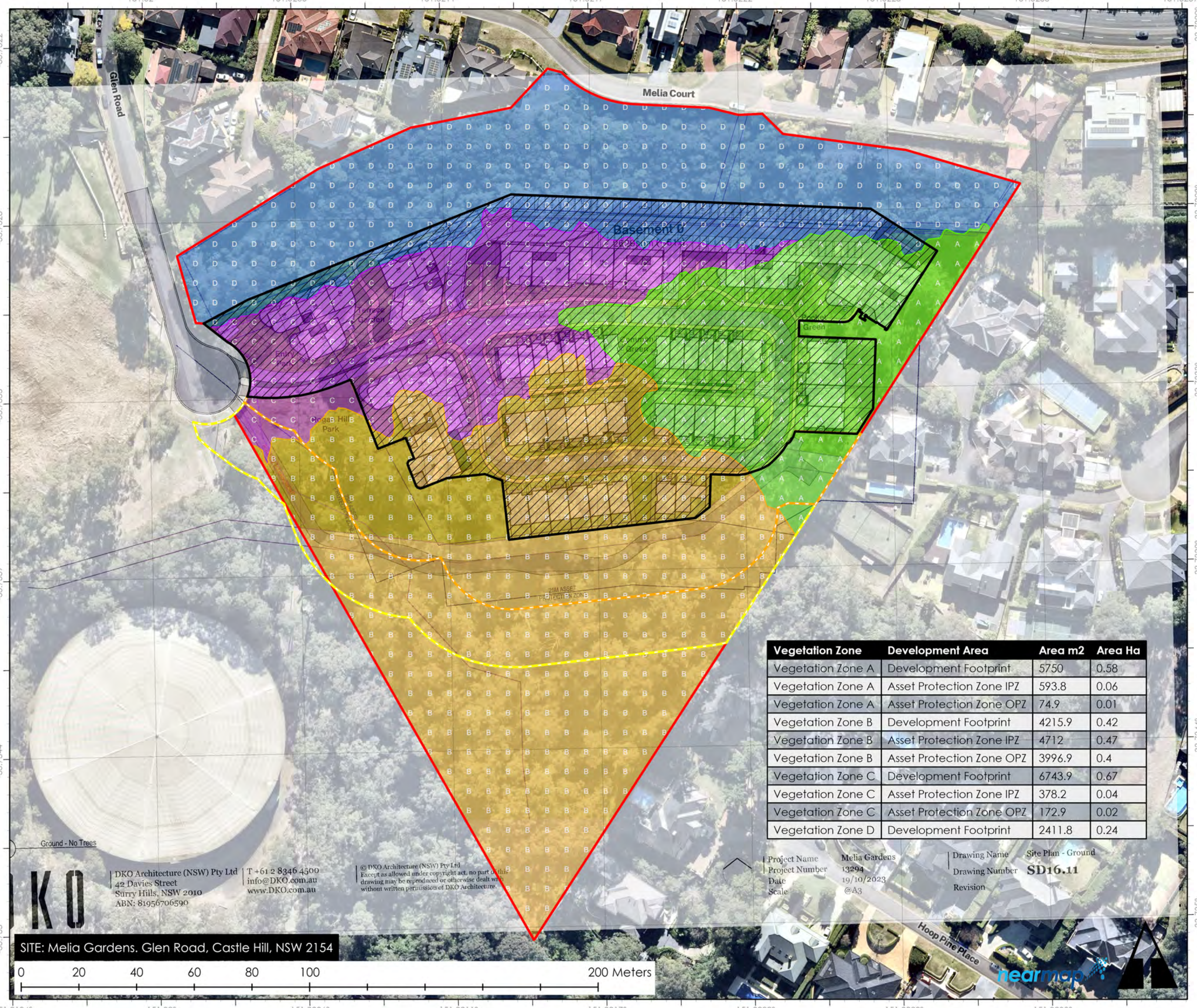
Subject Site

Development Footprint

- Development Footprint
- Asset Protection Zone IPZ
- Asset Protection Zone OPZ

Surveyed Vegetation Zones

- Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136
- Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136
- Vegetation Zone C: Non-native vegetation - exotic grassland
- Vegetation Zone D: Non-native vegetation - environmental weeds



Vegetation Zone	Development Area	Area m2	Area Ha
Vegetation Zone A	Development Footprint	5750	0.58
Vegetation Zone A	Asset Protection Zone IPZ	593.8	0.06
Vegetation Zone A	Asset Protection Zone OPZ	74.9	0.01
Vegetation Zone B	Development Footprint	4215.9	0.42
Vegetation Zone B	Asset Protection Zone IPZ	4712	0.47
Vegetation Zone B	Asset Protection Zone OPZ	3996.9	0.4
Vegetation Zone C	Development Footprint	6743.9	0.67
Vegetation Zone C	Asset Protection Zone IPZ	378.2	0.04
Vegetation Zone C	Asset Protection Zone OPZ	172.9	0.02
Vegetation Zone D	Development Footprint	2411.8	0.24

NOTE: Development Plans have been geo-rectified from Aerial Imagery Not Survey Accurate on Map. For Illustration Purposes ONLY

Plans - DKO Site Plan - Ground No. SD16.11 Rev. 19/10/2023

Base Spatial Layers - NSW State Dept Open Source Accurate as of Sept 2023 GDA2020

DATE : 12/12/2023
Map Version: 1_2

Aerial Imagery: Nearmap 12/08/2023 GDA2020

Projected Coordinate System: GDA 2020 Zone 56

Scale: 1:1,200

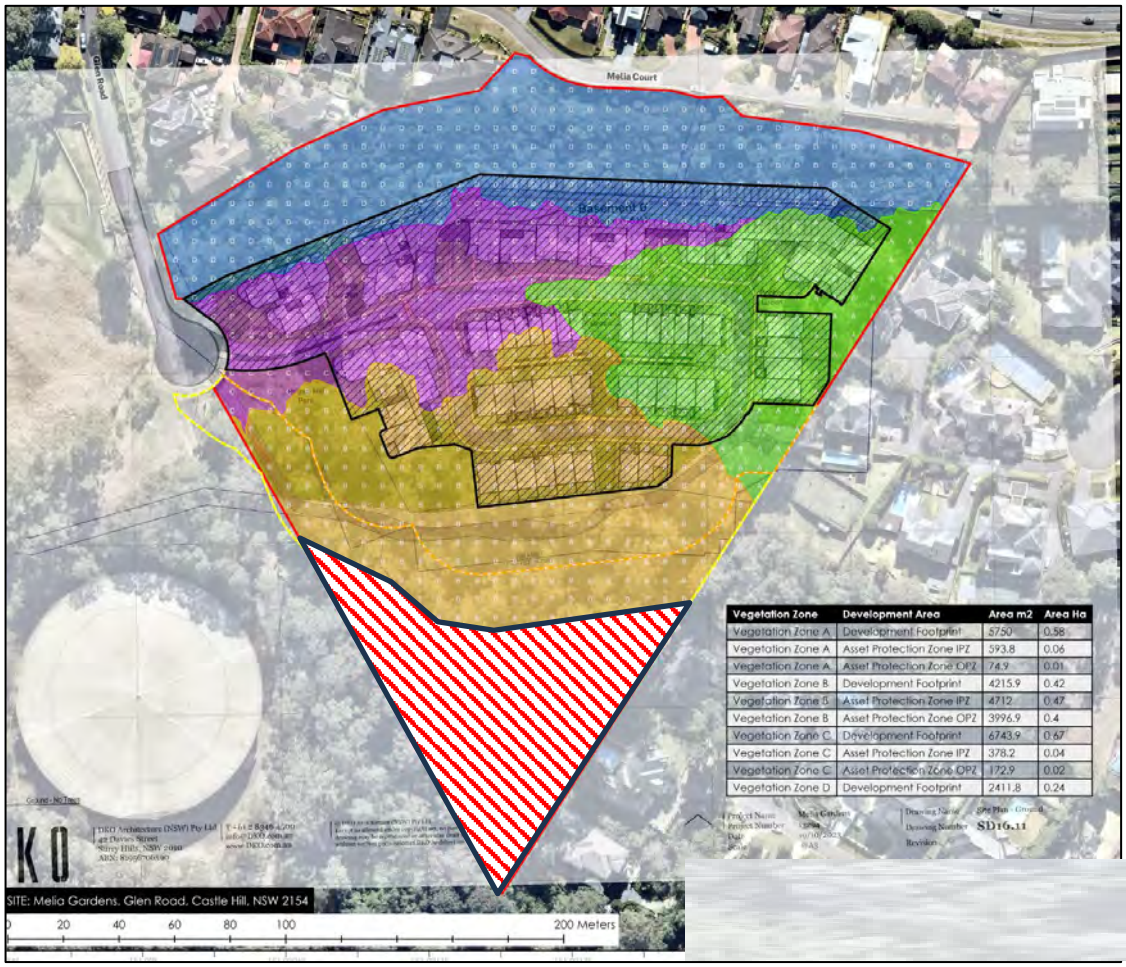


Figure 17 Southern intact BGHF remnant proposed for retention (red diagonal shaded area) equating to approximately 0.8ha

Risk of runoff, erosion and sedimentation, during construction

Surface water quality may be affected during construction activities. Construction activities could potentially encourage soil erosion and increase the sediment loads in downstream areas. Further, accidental leaks/spills of oil, fuel, cement or other substances entering watercourses could pollute surface waters.

The Construction Environment Management Plan (CEMP) can be provided with the application addresses these issues es (prior to the release of the Construction Certificate).

Temporary noise, dust, light and vibration disturbance, during construction work

Impacts of noise, dust, light and vibration upon fauna are difficult to predict. Potential impacts may include effects on predator-prey interactions and changes to mating and nesting behaviour. These are unlikely to be significant in relation to existing situation.

4.6.2 Potential Indirect Impacts

Minor hydrological changes

Hard surfaces created as a result of construction typically cause some hydrological changes; however, in this case, hydrological changes are expected to be very minor.

Please refer to hydraulic engineering and stormwater related consultant reports regarding the management of stormwater. OSD basins have been proposed in the southwestern corner of the development site. Rainwater re-use will also minimise run off impacts to BGHF to be retained downslope of the site.

4.6.3 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 Site. 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 5.1.2 below).

The proposal has the potential for edge effects on retained vegetation adjacent to the Study Area/Development Site. Potential indirect impacts that could occur as a result of the project include:

- Accidental incursion during clearing works.
- Increased weed invasion due to edge effects.
- Increase in dust during clearing works.
- Increase in noise during clearing works.

A site-specific Construction Environment Management Plan will be prepared prior to commencement of any clearing or construction works to ensure that impacts to other areas outside the Development Site are minimised. Measures to be included in the Management Plan are discussed in Section 4.8.

Increased movement of vehicles has the potential to transport weeds and pathogens into the Development Site and adjacent vegetation. Given the high levels of disturbance within the site, there is also the risk that weeds may be transported off-site. Mitigation measures to reduce the chance of weed spread are outlined in in Section 4.8.

Table 13 Indirect impacts, extent and duration and consequences

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 development 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.	Nil	Edge effects will not be created and increase weed intensity and reduce vegetation integrity.

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.
(b) reduced viability of adjacent habitat due to edge effects	The proposed development 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.	Nil	Edge effects will not be created and 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 within surrounding lots, or otherwise unlikely to occur within the Subject Site.	Nil	Nil
(d) transport of weeds and pathogens from the site to adjacent vegetation	The proposed development 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 prior to and post construction.	Nil	Edge effects will not be created and increase weed intensity and reduce vegetation integrity.
(e) increased risk of starvation, exposure and loss of shade or shelter	This issue is unlikely to occur on the Subject Site. It is unlikely that any threatened fauna relies on habitat within the Subject Site, such that the proposed impacts	Nil	Nil

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.
	will lead to increased risks from starvation, exposure, shade and shelter. All habitat resources removed will be replaced through implementation of the recommendations outlined in this report.		
(f) loss of breeding habitats	Nil	Nil	Nil
(g) trampling of threatened flora species	This issue is not likely to affect the Subject Site. No threatened flora species were identified within the Subject Site.	Nil	Nil
(h) inhibition of nitrogen fixation and increased soil salinity	This issue is not likely to affect the Subject Site.	Nil	Nil
(i) fertiliser drift	This issue is not likely to affect the Subject Site.	Nil	Nil
(j) rubbish dumping	This issue is not likely to affect the Subject Site.	Nil	Nil
(k) wood collection	This issue is not likely to significantly affect the Subject Site.	Nil	Nil
(l) bush rock removal and disturbance	No bush rock occurs on-site.	Nil	Nil
(m) increase in predatory species populations	It is unlikely that the proposed works will influence or alter predatory species populations.	Nil	Nil
(n) increase in pest animal populations	It is unlikely that the proposed	Nil	Nil

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.
	works will influence or alter pest species populations.		
(o) increased risk of fire	This issue is not relevant to the Subject Site as there is little identified bushfire hazard.	Nil	Nil
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	There is no specialist breeding or foraging habitat on the Subject Site. The site contains a stand of mixed, nectar producing canopy trees which can provide intermittent nectar resources for several threatened fauna species.	Nil	Nil

4.6.4 Prescribed and Uncertain Impacts

This section of the BDAR addresses relevant prescribed impacts in accordance with Section 6 of BAM 2020. 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 (Table 8 & Table 9).

Prescribed impacts are identified in clause 6.1 of the BC Regulation and BAM Stage 1, Chapter 6 (see also BAM Operational Manual – Stage 1).

Prescribed impacts may affect biodiversity values in addition to, or instead of, impacts from clearing native vegetation. They can be direct and/or indirect impacts.

These impacts may be difficult to quantify or offset, as they often affect biodiversity values that are irreplaceable; consequently, avoiding or minimising such impacts is critical.

Table 14 Prescribed Impacts and Importance for Threatened Entities

Prescribed Impact	Threatened Entity	Importance
Removal of non-native vegetation – areas of open managed non-native grass	*Ninox strenua* Powerful Owl *Callocephalon fimbriatum* Gang-gang Cockatoo *Pommerhelix duralesnsis* Dural Land Snail	Disturbance-free buffers of 100 m around potential Powerful Owl nest trees and 200 m around Gang-gang Cockatoo nest trees are important for ensuring no risk to breeding success. These buffers overlap non-native vegetation to be impacted by the development. However, these areas are highly unlikely to provide important habitat to threatened species as they managed exotic grasslands. The removal of this non-native vegetation is, therefore, unlikely to impact threatened species or ecological communities.
Animal strike by operation of internal access roads	*Ninox strenua* Powerful Owl *Callocephalon fimbriatum* Gang-gang Cockatoo	The proposed internal access roads passes through potential foraging habitat. Increased vehicular traffic could result in increased risk of vehicle strike (Table 15). Mitigation measures outlined in Section 4.8 are designed to reduce this risk.

Table 15: Overall Consideration of Potential Prescribed or Uncertain Impacts of the Proposed Action

Will there be impacts on any of the following	Yes/No	If Yes, must 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	n/a
Habitat of threatened species or ecological communities associated with rocks	No	n/a
Habitat of threatened species or ecological communities associated with human made structures	No	n/a
Habitat of threatened species or ecological communities associated with non-native vegetation	Yes	The removal of this non-native vegetation is, therefore, unlikely to impact threatened species or ecological communities.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	Habitat connectivity continues to exist across the site. It is unlikely that the area of impact will interrupt connectivity for any threatened fauna or flora species.
Movement of threatened species that maintains their life cycle	No	Habitat connectivity continues to exist across the site. It is unlikely that the area of impact will interrupt movement of any threatened fauna or
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	No areas defined as riparian zones under the Water Management Act 2000 occur on-site. Perennial streams are absent.
Wind turbine strikes on protected animals	No	n/a
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	Yes – roads and increased traffic is proposed	Refer to Table 16

Will there be impacts on any of the following	Yes/No	If Yes, must address all of the assessment questions from section 9.2.1 of the BAM
		Speed limits within the Development Site will be limited to 40 km/hr. This limit will be included in the EMP and be communicated in site inductions

Table 16 Assessment of Impacts due to Vehicle Strike

No	Assessment requirements	Impact Assessment
A)	Predict the likelihood of vehicle strike to each relevant species, considering mobility, abundance, range and other relevant life cycle factors	The likelihood of vehicle strike is expected to be low due to the high mobility Powerful Owl and Gang-Gang Cockatoo their low abundance. Reducing speed limits within the site is likely to result in even lower likelihood of vehicle strike.
B)	Estimate vehicle strike rates with supporting data or literature, where available	Bain et el (2014) estimates that of a population of 120 Powerful Owls in the Sydney region there are nine fatal strikes per year. No information was found in relation to vehicle strikes on Gang- Gang Cockatoo.
C)	Predict the consequences of the impacts for the persistence of the relevant species	As the likelihood of fatal vehicle strike is low it is not likely that the increased risk of vehicle strike due to the proposal will affect the persistence of the Powerful Owl and Gang-Gang Cockatoo, however it is likely to affect the success of the breeding season and reduce the likelihood of breeding success within the subject land.
D)	Justify predictions of impacts with relevant literature and other published sources of information	The TBDC identifies road mortality and injury as a key threat to the Powerful Owl. The TBDC does not identify road mortality and injury as a key threat to Gang-Gang Cockatoo.

4.7 Avoidance of Impacts

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the project to date, in accordance with Section 7 of BAM 2020. The proposed development has undergone several reiterations and avoids impacts to native vegetation as much as possible.

In relation to the recommendations for avoiding and minimising impacts on native vegetation and habitat during the proposal design and planning phase, as per Section 7.1 and 7.2 of BAM 2020:

- Alternative locations - The proposal is a residential subdivision proposed to occur on a large lot surrounded by existing residential development that is appropriate for the location. No other locations are available for consideration as part of the proposed development.
- Alternative sites within the property (designing the project layout) - The proposed building envelopes and associated infrastructure have been designed to avoid impacts to better condition native vegetation (including threatened ecological communities) within the site; however, vegetation clearing as per the previously approved development footprint is required for the development footprint and 25m APZ around the south side of the proposal.
- Design measures to avoid or minimise impacts on biodiversity values considered against the items under Section 7.1.2 of BAM 2020 in Table 16 below.

Table 17 Justification of Project Design

No	Requirement	Design Justification
1a)	*Reducing the proposal's clearing footprint by minimising the number and type of facilities*	The number of lots and development footprint area was not significantly changed during the development design process as the proposal occurs within the same area as the previously approved development footprint.
1b)	*Locating ancillary facilities in areas that have no biodiversity values*	The building envelopes, driveways, entry road, emergency access and services were carefully planned to reduce impacts to areas of native vegetation and tree removal - the proposal occurs within the same area as the previously approved development footprint.
1c)	*Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)*	The proposed development is concentrated on the northern portion of the site where vegetation is in the poorest condition (being mainly managed grassland and environmental weed species).
1d)	*Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)*	The proposed development is concentrated on the northern portion of the site where vegetation is in the poorest condition and does not represent the CEEC or SAII. Better quality BGHF vegetation in the southern portion of the site will be retained.
1e)	*Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land*	The proposal includes measures for the dedication and future protection of the BGHF in the southern portion of the subject land. This includes the BGHF Endangered Ecological Community on the southern portion of Lot 2 DP 576773 Glen Road CASTLE HILL NSW 2154 is the subject to a Vegetation Management Plan under a Planning Agreement relating to the land. This area is to be placed under an 88B restriction as to its use and enforced under Section 88E of the Conveyancing Act, 1919. The ecological integrity of the Endangered Ecological Community is to be maintained. All Asset Protection Zones are to be located outside the area which will be subject to the Vegetation Management Plan and the 88B restriction as to its use.

4.8 Mitigation of Impacts

Several mitigation measures are proposed to minimise potential impacts; these are summarised in Table 18. These include measures to be implemented in the pre-construction, construction and post-construction phases. It is considered that these measures would serve to minimise any potential direct or indirect impacts.

A Vegetation Management Plan has been provided for retained BGHF in the southern portion of the site.

The main fauna impact mitigation measures recommended include the preparation of a Wildlife Management Plan prior to the release of the Construction Certificate that includes:

Pre-clearing inspections

Whilst on-site, the Ecologists surveyed all areas identified to be cleared, for significant biodiversity features including but not limited to:

Habitat of all fauna (particularly threatened fauna) including:

- Habitat Trees (including hollow-bearing trees, decorticating bark, and bird nests);
- Caves, crevices and culverts (habitat for threatened reptiles, small mammals and microbats);
- Fauna burrows and warrens;
- Termite mounds (habitat for reptiles and birds);
- Soaks and moist areas (habitat for frogs);
- Dural Land Snails – searches amongst coarse woody debris, tree bases, sandstone caves and leaf litter
- Trees and shrubs supporting nest structures (habitat for birds and arboreal mammals); and
- Any other habitat features that may support fauna species.
- Locations of any threatened flora species;
- Locations of all weeds listed as Priority under the Biosecurity Act 2015;
- Opportunistic sightings of fauna utilising habitat within the Project Area;
- Locations of nearby habitat (outside the Subject Site) suitable for the release of fauna that may be encountered during clearing.

Habitat Demarcation and Photographs

During the pre-clearing survey, the ecologists shall demarcate any habitat tree within the Subject Site by wrapping yellow and black hazard tape around the main stem at breast height.

APZ identification fencing

Prior to any building works commencing on site temporary markers should be erected on the interface between the work zone and the native vegetation to be retained within the APZ. The markers should be installed by a registered surveyor.

The APZ shall be established in accordance with approved Tree Protection Management Plan provided in the Arborist Impact Assessment Report prepared by H2O Consulting and Black Ash Consulting.

Signage should be attached to the chain-wire fence to notify people involved in construction works to 'Keep Out - Environmentally Sensitive Area'.

The temporary fence is to stop the following occurring:

- Stockpiling of materials within significant bushland.
- Placement of fill within significant bushland.
- Parking of vehicle within significant bushland.
- Compaction of soil within significant bushland.
- Cement washout and other chemical or fuel contaminants within significant bushland.
- Damage to threatened plants and their habitat.

Additional targeted surveys must be undertaken by the Project Ecologist for the Dural Snail - *Pommerhelix duralensis* no more than 48hrs prior to vegetation clearing within the Subject Site. All snails identified will be captured and relocated to the parcel of bushland to be retained in the southern extent of the property.

Table 18 Mitigation measures proposed to minimise potential impacts

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
Project location	The location of the proposed development has been positioned in order to avoid and minimise the potential resulting impacts on biodiversity values within the Subject Site, where possible.	Risk = low Consequence = Harm to native vegetation and native fauna	Pre-construction phase	Proponent
Project design	The proposed development has been designed to avoid and minimise impacts on native vegetation and habitat where possible within the Subject Site. Where this is not possible, mitigation measures have been designed and recommended to reduce potential ecological impact. While there will be some impact on native vegetation, this falls above the Biodiversity Offset Scheme threshold. The design of the proposed development includes the retention of a majority of the trees on the property. The poor condition of the vegetation occurring on-site is reflected in the low Vegetation Integrity Score calculated for the property.	Risk = low Consequence = Harm to native vegetation and native fauna	Pre-construction phase	Proponent
Tree protection	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 development sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. 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. 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..	Risk = low Consequence = Harm to native vegetation and native fauna. Proliferation of weeds.	Pre-construction phase	

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
Avoidance of hollow-bearing trees	No hollow-bearing trees occur within the proposed development footprint.	Risk = low Consequence = Loss of fauna habitat. Loss of native vegetation.	Construction phase	Proponent
Avoidance of woody debris	Woody debris within the development footprint should be relocated, by the proponent to the area of native vegetation in the northern extent of the Subject Site.	Risk = low Consequence = Loss of fauna habitat.	Construction phase	Proponent
Erosion and sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Risk = low Consequence = Degradation of vegetation,	Construction phase	Construction Contractor
Erosion protection fencing	Temporary fencing should be erected around the extent of native vegetation to be retained in order to minimise any disturbance resulting from the proposed construction works.	Risk = high Consequence = Permanent damage or degradation of vegetation.	Construction phase	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.	Risk = moderate Consequence = Harm to native vegetation and native fauna	Construction phase	Construction Contractors
Weed eradication and suppression	All priority weeds should be eradicated across all areas of the Subject Site. Very low weed invasion was recorded on-site. Any weeds should be continually supressed and prevented from re-establishing within retained native vegetation.	Risk = moderate Consequence = Harm to native vegetation and native fauna habitat.	Construction phase and Post-construction phase	Proponent
Stormwater	The proposed development is unlikely to result in significant changes to stormwater runoff so it is expected there will be no exacerbated impact on native species of flora and fauna. Stormwater flow from future development and hard surfaces will be directed to newly installed water storage tanks. Prior to any release, all stormwater is to be piped through any tanks that may be required by the regulating authorities.	Risk = low Consequence = Harm to native vegetation and native fauna habitat.	Post-construction phase	Proponent Construction Architect

A Construction Environment Management Plan (CEMP) can be provided with the application prior to the release of the Construction Certificate to address all issue in Table 4.5.

4.9 Impacts Which Require an Offset

Tables 5-1 and 5-2 provide a summary of the impacts that require an offset, under the BAM.

Table 4-19: Vegetation Zones Requiring an Offset

PCT	Vegetation Zone	Area (ha)	Vegetation Integrity Score	Credits required
PCT 3136	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	0.65	11.3	0
PCT 3136	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	1.29	19.2	8
Unclassified/ non conformant with a PCT	Vegetation Zone C: Non-native vegetation - exotic grassland	0.73	n/a	0
Unclassified/ non conformant with a PCT	Vegetation Zone D: Non-native vegetation - exotic grassland	0.24	n/a	0

Table 4-20: Threatened Species Requiring an Offset

Species	Area of Impacted Habitat (ha)	SAII entity	Number of Species Credits Required
Powerful Owl	1.9 ha (buffered 100m from potential HBTs potential disguised by vines)	No	10
Gang Gang Cockatoo	1.9 ha (buffered 100m from potential HBTs potential disguised by overgrown vines)	No	10
Pommerhelix duralensis / Dural Land Snail	1.9 ha (highly cryptic species therefore assumed present as a precautionary measure)	No	10

4.10 Impacts Not Requiring an Offset

Areas within the Development Site not requiring assessment in accordance with Section 9.3 of the BAM (DPIE, 2020a) include:

- Cleared and highly disturbed land (Vegetation Zone C);
- Exotic vegetation (Vegetation Zone D);

4.11 Identification of Areas Not Requiring Assessment

N/A

4.12 Serious and Irreversible Impacts (SAII's)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

- it will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

Species and ecological communities with a 'very high' biodiversity risk weighting will be a potential serious and irreversible impact (SAII). These 'potential SAII entities' are identified within the BAM calculator.

The determination of serious and irreversible impacts on biodiversity values is to be made by the consent authority in accordance with the principles set out in the BC Regulation.

To assist the consent authority, the guidance document Guidance to assist a decision-maker to determine a serious and irreversible impact includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation to identify the species and ecological communities that are likely to be the subject of serious and irreversible impacts.

BGHF is listed as a threatened SAII entity.

Please refer to SAII assessment for this species provided on the following pages (Table 21).

Table 21 Impact Assessment for BGHF CEEC at Risk of an SAII

Table 21 Impact Assessment for BGHF CEEC at Risk of an SAII

No	Assessment Criteria	SAII Assessment Information
2a	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of reduction in geographic distribution as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)*	It is difficult to ascertain the 1970 extent; however, the BGHF Final determination estimates that there has been a 90% reduction in the total geographic extent of BGHF since European Settlement (ie since 1788). The BGHF Final Determination states the following in relation to a reduction in geographic extent: '*Only 6% of the original extent of the community remained in 1988 (Benson, D. & Howell, J. 1990 Proc. Ecol. Soc. Aust. 16, 115-127) in the form of small and fragmented stands. Although some areas occur within conservation reserves, this in itself is not sufficient to ensure the long term conservation of the Community unless the factors threatening the integrity and survival of the Community are ameliorated.*". *Based on aerial photography flown in November 1998, Tozer (2003) estimated the total extent of woody vegetation referred to as Blue Gum High Forest was 11 054 (±1 564) ha (upper and lower plausible bounds, sensu Keith et al. 2009), representing 8.8 (±1.2)% of the pre-European distribution of the community. Patches of the community lacking woody vegetation are very small in extent and can be considered to be included within the plausible bounds. For that part of the community's distribution to the east of the Hawkesbury-Nepean River, earlier mapping at coarser resolution by Benson & Howell (1990b) suggests a similar level of depletion, with an estimated 6 420 ha of 'Blue Gum High Forest', representing 6% of the pre-European distribution east of the Hawkesbury-Nepean River. An update of Tozer's (2003) map, based on interpretation of imagery flown in January-March 2007 shows that the extent of S Blue Gum High Forest east of the Hawkesbury – Nepean River had declined by 442±46 ha, a reduction of 5.2±0.6% in 9 years (NSW Scientific Committee & Simpson 2008). These estimates indicate that the geographic distribution of the community has undergone a very large reduction over a time frame appropriate to the life cycle and habitat characteristics of its component species.*
2bi	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: change in community structure*	The BGHF Final Determination states the following in relation to the changein community structure: "*Remnants of BGHF have historically been subjected to a range of anthropogenic disturbances including logging, grazing by domesticated livestock and burning at varyingintensities (Benson and Howell 1994). These disturbances have affected thestructure and potentially the composition of remnants. For example, the density and average basal diameter of trees in remnants sampled by Benson and Howell (1994) suggested that the removal of large older trees has led to higher densities of smaller trees such that remnants typically have the structure of regrowth forest.*"

No	Assessment Criteria	SAII Assessment Information
2bii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: change in species composition*	
2biii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: disruption of ecological processes*	The BGHF Final Determination states the following in relation to the disruption of ecological processes: "*The threats to BGHF listed above are ongoing and likely to cause continuing declines in geographic distribution and disruption of biotic processes andinteractions.*" *The reduction in the geographic distribution of Blue Gum High Forest was initially due to tree-felling for timber and clearing for crops and pastures (Benson & Howell 1990a). Benson & Howell (1990b) estimated that the community had been reduced to approximately half of its pre-European extent by 1850. Following World War II, there was a marked acceleration in urban and industrial development, which continues to deplete the distribution of the community to the present day.* *These trends appear likely to continue into the future as the urban area continues to expand to accommodate Sydney's increasing population, which is projected to grow by 1.0-1.1 million people during the 20 years 2007-2026 and 2.2-3.3 million during the 50 years 2007-2056 (Australian Bureau of Statistics 2008). Recent draft plans to develop growth centres in north-west and south-west Sydney, for example, identify staged release of land for residential and employment development over the next 25 years.* *These areas contain approximately 2000 ha (one-fifth) of the estimated remaining Blue Gum High Forest based on Tozer (2003), of which about two-thirds will be available for development, the loss of which is planned for offsetting through voluntary land acquisition and/or the establishment of conservation agreements on lands outside the Growth Centres (Growth Centres Commission 2007) for the primary purpose of biodiversity conservation. While important examples of Blue Gum High Forest are represented within conservation reserves, much of the remaining area of the community occurs on private land or on public easements, where it is at risk from small-scale clearing associated with housing, industrial development and transport infrastructure.*

		There are significant logistic and technological constraints and time lags associated with efforts to restore the community (Wilkins et al. 2003; Nichols 2005; Nichols et al. 2005). 'Clearing of native vegetation' is listed as a Key Threatening Process under the Threatened Species Conservation Act 1995.
2biv	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: invasion and establishment of exotic species*	*The BGHF Final Determination states the following in relation to weed invasion: "Remnants of Blue Gum High Forest are subject to ongoing invasion by an extensive range of naturalised plant species. Weed invasion is exacerbated by the proximity of remnants to areas of rural and urban development and the associated influx of both weed propagules from gardens and nutrients contained in stormwater runoff, dumped garden refuse and animal droppings (Leishman 1990, Benson and Howell 1994, Leishman et al. 2004, Smith and Smith 2010). Species such as Ligustrum lucidum (Large-leafed Privet) and Ligustrum sinense (Small-leafed Privet) are highly invasive under conditions of enhanced soil nutrients and have been recorded in at least half of all plots sampling BGHF by Tozer (2003). Other frequently recorded species include the shrubs Ochna serrulata (Mickey Mouse Plant), Phytolacca octandra (Inkweed), Sida rhombifolia (Paddy's Lucerne) and Chrysanthemoides monilifera (Bitou Bush/Boneseed), the scandent shrubs Lantana camara (Lantana) and Asparagus aethiopicus (Asparagus Fern), the climbers Araujia sericifera (Moth Vine), Asparagus asparagoides (Bridal Creeper) and Hedera helix (English Ivy) and the grasses Paspalum dilatatum (Paspalum), Ehrhata erecta (Panic Veldtgrass) and Setaria parviflora (Tozer 2003)".*

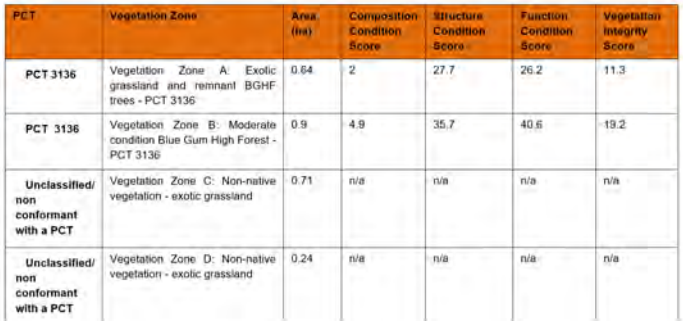
No	Assessment Criteria	SAII Assessment Information
2bv	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: degradation of habitat*	*There is no information regarding evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by degradation of habitat.*
2bvi	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: fragmentation of habitat*	*The BGHF Final Determination states the following in relation to fragmentation of BGHF habitat: "Remnants of Blue Gum High Forest are typically small and fragmented and are susceptible to continuing attrition through clearing for routine land management practices due to the majority of remnants being located in close proximity to rural land or urban interfaces (Benson and Howell 1994; Tozer 2003)."*
2ci	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: extent of occurrence*	*The BGHF Final Determination states the following with respect to extent of occurrence in NSW: "The distribution of Blue Gum High Forest is highly restricted. The extent of occurrence (EOO) of BGHF is 4,479 km2 based on a minimum convex polygon enclosing known occurrences of the community as interpreted in Sections 4.2 – 4.10 and using the method of assessment recommended by IUCN (Bland et al. 2017). The estimated area of occupancy (AOO) is 12 10 km x 10 km grid cells, the scale recommended for assessing AOO by IUCN and applying a minimum occupancy threshold of 1% (Bland et al. 2017)."*
2cii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: area of occupancy*	*The BGHF Final Determination states the following with respect to extent of occurrence in NSW: "Tozer et al. (2010) estimated some 2,300 ha of BGHF remains". "Additional remnants of BGHF have been mapped by BMCC (2003) (a total of 190 ha) and Smith and Smith (2008) (148 ha). Combining these maps with the maps of Tozer et al. (2010) and NSW OEH (2013ab) gives an estimated 2,940 ha of BGHF remaining"*

2ciii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: number of threat-defined locations*	*The Final Determination indicates that there is very little BGHF CEEC within conservation reserves and "unreserved areas are subject to the threat of vegetation clearing". Reserved areas are described as follows: "An estimated 280 ha of BGHF (less than 1% of the pre-European extent) is distributed among 15 reserves (with a minimum area of 0.5 ha) under the management of the NSW National Parks and Wildlife Service (Tozer et al. 2010; BMCC 2003; Smith and Smith 2008; NSW OEH 2013a). This includes 112 ha in Bargo SCA, 49 ha in Blue Mountains NP, 25 ha in Lane Cove NP and 22 ha in Newington NR. A further 254 ha occurs in Crown Reserves and 36 ha is preserved in perpetuity under Biobanking or Conservation Agreements. The total area under reservation is estimated to be 570 ha, equivalent to less than 2% of the estimated pre-1750 distribution or 20% of the remaining extent."*

No	Assessment Criteria	SAII Assessment Information
2d	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence that the TEC is unlikely to respond to management*	There is no information regarding evidence that the TEC is unlikely to respond to management. The *Department of Environment and Conservation (NSW). (2005) Document - Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland.* *Department of Environment and Conservation (NSW), Sydney* outlines theoretical and practical'best practice' guidance for the restoration of BGHF, including examples of small remnant patches.
3	*Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR or BCAR.*	It is difficult to ascertain the 1970 extent of the TEC when most studies have focussed on pre-European extent, therefore pre-European data is referenced in (2a). No information was able to be presented in relation to (2bv) and (2d).
4ai	*Include data and information on the impact on the geographic extent of the TEC by estimating the total area of the TEC to be impacted by the proposal: in hectares. Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.*	T The Arborist Impact Assessment Report (AIA) prepared by H20 Consulting identifies that There are 209 trees located within the proposal footprint, which will require removal (Table 4 & Figure 3 of the AIA). This includes 69 BGHF trees. The AIA states that 72 High Retention Value trees occur within the proposal footprint and will require removal to allow for construction works. The total area of the site is 4.5 hectares of which approximately 1ha comprises of moderate condition BGHF proposed for removal (Figure 11 – Vegetation Zone B). It still contains a high level of weed invasion. The total area of introduced environmental weeds or highly degraded BGHF comprises of approximately 1.5ha of the proposed development footprint (including APZ and internal roads). This includes Vegetation Zones A, C and D. The total remaining approximate area of 0.8 ha of moderate condition BGHF vegetation (outside proposed APZs) is to be protected and enhanced via the proposed Vegetation Management Plan (prepared by Fraser Ecological Consulting) comprises approximately 1.5ha (refer to Figure 12)

4aii	*Include data and information on the impact on the geographic extent of the TEC by estimating the total area of the TEC to be impacted by the proposal: as a percentage of the current geographic extent of the TEC in NSW. Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.*	According to the Final Determination the current estimate of BGHF CEEC in NSW is 2,940 ha. The total area impacted by the proposed is approx. of 1.5 ha of degraded BGHF. Therefore, the impact of the proposal on the geographic extent is estimated at less than 0.2%.
4bi	*The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals.*	This patch will not be fragmented by the proposal.

<table>
<tr><th>No</th><th>Assessment Criteria</th><th>SAII Assessment Information</th></tr>
<tr><td>4bii</td><td>The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
• distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
• estimated maximum dispersal distance for native flora species characteristic of the TEC, and
• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development</td><td>The Arborist Impact Assessment Report (AIA) prepared by H20 Consulting identifies that There are 209 trees located within the proposal footprint, which will require removal (Table 4 & Figure 3 of the AIA).
This includes 69 BGHF trees. The AIA states that 72 High Retention Value trees occur within the proposal footprint and will require removal to allow for construction works.
The total area of the site is 4.5 hectares of which approximately 1ha comprises of moderate condition BGHF proposed for removal (Figure 11 – Vegetation Zone B). It still contains a high level of weed invasion.
The total area of introduced environmental weeds or highly degraded BGHF comprises of approximately 1.5ha of the proposed development footprint (including APZ and internal roads). This includes Vegetation Zones A, C and D.
The total remaining approximate area of 0.8 ha of moderate condition BGHF vegetation (outside proposed APZs) is to be protected and enhanced via the proposed Vegetation Management Plan (prepared by Fraser Ecological Consulting) comprises approximately 1.5ha (refer to Figure 12)
No fragmentation will occur as existing BGHF trees along the eastern boundary will be retained and it is expected that the flora and fauna within the Forest will be able to readily disperse between these two areas.

This is because the EEC remains as part of a continuous area of bushland including areas off-site on adjacent properties. The removal of one tree will not fragment community and prevent it from it functioning in dispersal of seed and pollen/ genetic material from canopy trees off the subject site.</td></tr>
<tr><td>4biii</td><td>The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</td><td>The Vegetation Integrity (VI) of the BGHF CEEC vegetation is 11.3 and 19.2 and is made up of thefollowing scores for composition, structure and function:
 
<table>
<tr><th>PCT</th><th>Vegetation Zone</th><th>Area (ha)</th><th>Composition Condition Score</th><th>Structure Condition Score</th><th>Function Condition Score</th><th>Vegetation Integrity Score</th></tr>
<tr><td>PCT 3136</td><td>Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136</td><td>0.64</td><td>2</td><td>27.7</td><td>26.2</td><td>11.3</td></tr>
<tr><td>PCT 3136</td><td>Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136</td><td>0.9</td><td>4.9</td><td>35.7</td><td>40.6</td><td>19.2</td></tr>
<tr><td>Unclassified/ non conformant with a PCT</td><td>Vegetation Zone C: Non-native vegetation - exotic grassland</td><td>0.71</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Unclassified/ non conformant with a PCT</td><td>Vegetation Zone D: Non-native vegetation - exotic grassland</td><td>0.24</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
</table></td></tr>
<tr><td>5</td><td>The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.</td><td>N/A</td></tr>
</table>

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APPENDIX A SITE PLANS

APPENDIX B PLOT DATA

BAM Site – Field Survey Form

Survey Name		Date	Zone ID	Recorders	
1020 Melia Court, Castle Hill		24/7/2022	Veg Zone A Exotic grassland and remnant BGHF trees_PCT 3136	Alex Fraser & Jesse McIvor	
Zone: 56	Datum: MGA	Plot ID: 1	Plot dimensions: 50x20 m		Photo #:
Easting: 316772	Northing: 6265678	IBRA region: Sydney Basin		Midline bearing from 0 m:	
Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub-formation) Vegetation Class: North Coast Wet Sclerophyll Forests PCT Name: Blue Gum High Forest PCTID: 3136 EEC: Yes – Blue Gum High Forest Critically Endangered Ecological Community					Confidence High Confidence High

Record easting and northing at 0m on midline. Dimensions (Shape) of 0.04ha base plot.

BAM Attribute (400m^2 plot)	Sum values	
	Count of native richness	Cover
Trees	**2**	**35**
Shrubs	**1**	**10**
Grasses etc.	**0**	**0**
Forbs	**0**	**0**
Ferns	**0**	**0**
Other	**0**	**0**
High threat weed cover		**20.5**

Cover: 0.1, 0.2, 0.3….. 1,2,3,……,10, 15, 20, 25, ….. 100% (foliage cover). *Note: 0.1% cover is approx.. 63x63 cm or a circle about 71 cm diameter, 0.5% approx. 1.4 x 1.4m, 2% cover is approx. 2 x 2m, 5% = 4 x 5m, 25% 10 x 10m*

BAM Attribute (1000m^2 plot)		
DBH	**#Tree Stems Count**	**#Stems with Hollows**
80 + cm	1	-
50 – 79 cm	2	-
30 – 49 cm	2	-
20 – 29 cm	3	-
10 – 19 cm	1	-
5 – 9 cm	-	-
<5 cm		
Length of logs (m) (≥ 10 cm diameter, >50cm in length)	**Tally: 0**	**Total:** 0

Counts apply when the number of tree stems within a size class is ≤ 10. Estimate can be used when > 10 (eg. 10, 20, 30….100, 200). For a multi-stemmed tree, only the largest living stem is included in the count / estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)																				
	Litter cover %					Bare ground cover %					Cryptogam cover %					Rock cover %				
	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45

Subplot score % in each	30	30	30	30	30															
Average of the 5 subplots	**30**					n/a					n/a					n/a				

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter)

BAM Site – Plot Species List

400m² plot: Sheet ___ of ___	Survey Name	Plot ID	Recorders
Date: 24/7/22	**1020 Melia Court, Castle Hill**	Vegetation Zone A: Exotic grassland and remnant BGHF trees - PCT 3136	ALEX FRASER and JESSE MCIVOR

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
Tree	*Eucalyptus saligna*	N	30	5	C		
Shrub	*Acacia implexa*	N	10	4	S		
	Cinnamomum camphora	HTE	5	1	C		
	Lantana camara	HTE	2	2	S		
	Pennisetum clandestinum	E	30		G		
	Ipomoea indica	HTE	1	3	G		
	Bidens Pilosa	HTE	3	5	G		
	Lonicera japonica	THE	1	2	G		
	Zantedeschia aethiopica	E	1	1	G		
	Cestrum parqui	HTE	2	2	G		
	Ligustrum lucidum	HTE	2	1	G		
	Ligustrum sinense	HTE	2	1	G		
	Sonchus oleraceus	E	1	2	G		
	Hypochaeris radicata	E	0.5	2	G		
	Eharta erecta	HTE	0.5	3	G		
Tree	*Glochidion ferdinnandi*	N	5	1	C		
	Rubus fruticosus	HTE	0.5	1	G		
	Taraxicum officianale	E	2	2	G		
	Solanum nigrum	E	1	2	G		
	Ageratina adenophora	HTE	0.5	2	G		
	Arundo donax	HTE	1	1	S		

N: native, **E**:exotic, **HTE**: high threat exotic, **GF** – circle code if 'top 3'

Cover: 0.1, 0.2, 0.3….. 1,2,3,……,10, 15, 20, 25, ….. 100% (foliage cover). *Note: 0.1% cover is approx.. 63x63 cm or a circle about 71 cm diameter, 0.5% approx. 1.4 x 1.4m, 2% cover is approx. 2 x 2m, 5% = 4 x 5m, 25% 10 x 10m*

Abundance: 1, 2, 3, ….10, 20, 30, ….. 100, 200,…., 1000

Stratum: E – emergent, C – canopy, M – mid-storey / sub canopy, S – shrub layer, G – ground layer

BAM Site – Field Survey Form

Survey Name		Date	Zone ID	Recorders	
1020 Melia Court, Castle Hill Dwelling footprint and APZ		24/7/2022	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	Alex Fraser & Jesse McIvor	
Zone: 56	Datum: MGA	Plot ID: B	Plot dimensions: 50x20 m		Photo #:
Easting: 316697	Northing: 6265643	IBRA region: Sydney Basin		Midline bearing from 0 m:	
Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub-formation) Vegetation Class: North Coast Wet Sclerophyll Forests PCT Name: Blue Gum High Forest PCTID: 3136 EEC: Yes – Blue Gum High Forest Critically Endangered Ecological Community					Confidence High Confidence High

Record easting and northing at 0m on midline. Dimensions (Shape) of 0.04ha base plot.

BAM Attribute (400m^2 plot)	Sum values	
	Count of native richness	Cover
Trees	**3**	**46**
Shrubs	**1**	**5**
Grasses etc.	**0**	**0**
Forbs	**0**	**0**
Ferns	**0**	**0**
Other	**1**	**2**
High threat weed cover		**70**

Cover: 0.1, 0.2, 0.3….. 1,2,3,……,10, 15, 20, 25, ….. 100% (foliage cover). *Note: 0.1% cover is approx.. 63x63 cm or a circle about 71 cm diameter, 0.5% approx. 1.4 x 1.4m, 2% cover is approx. 2 x 2m, 5% = 4 x 5m, 25% 10 x 10m*

BAM Attribute (1000m^2 plot)		
DBH	**#Tree Stems Count**	**#Stems with Hollows**
80 + cm	1	-
50 – 79 cm	2	-
30 – 49 cm	5	-
20 – 29 cm	6	-
10 – 19 cm	1	-
5 – 9 cm	-	-
<5 cm		
Length of logs (m) (≥ 10 cm diameter, >50cm in length)	**Tally: 0**	**Total:** 0

Counts apply when the number of tree stems within a size class is ≤ 10. Estimate can be used when > 10 (eg. 10, 20, 30….100, 200). For a multi-stemmed tree, only the largest living stem is included in the count / estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)																				
	Litter cover %					Bare ground cover %					Cryptogam cover %					Rock cover %				
	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45

Subplot score % in each	30	30	30	30	30															
Average of the 5 subplots	**70**					n/a					n/a					n/a				

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter)

BAM Site – Plot Species List

400m² plot: Sheet ___ of ___	Survey Name	Plot ID	Recorders
Date: 24/7/22	**1020 Melia Court, Castle Hill**	Vegetation Zone B: Moderate condition Blue Gum High Forest - PCT 3136	ALEX FRASER and JESSE MCIVOR

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
Tree	*Eucalyptus saligna*	N	40	8	C		
Shrub	*Acacia implexa*	N	5	2	S		
Tree	*Pittosporum undulatum*	N	3	1	C		
Tree	*Glochidion feridinandi*	N	3	1	C		
	Cinnamomum camphora	HTE	1	1	C		
	Lantana camara	HTE	12	10	S		
	Ipomoea indica	HTE	50	>50	C		
	Lonicera japonica	HTE	1	1	S		
	Cestrum parqui	HTE	2	2	S		
	Ligustrum lucidum	HTE	2	4	S		
	Ligustrum sinense	HTE	2	4	S		
Other	*Stephania japonica*	N	2	4	S		

N: native, **E**:exotic, **HTE**: high threat exotic, **GF** – circle code if 'top 3'

Cover: 0.1, 0.2, 0.3….. 1,2,3,……,10, 15, 20, 25, ….. 100% (foliage cover). *Note: 0.1% cover is approx.. 63x63 cm or a circle about 71 cm diameter, 0.5% approx. 1.4 x 1.4m, 2% cover is approx. 2 x 2m, 5% = 4 x 5m, 25% 10 x 10m*

Abundance: 1, 2, 3, ….10, 20, 30, ….. 100, 200,…., 1000

Stratum: E – emergent, C – canopy, M – mid-storey / sub canopy, S – shrub layer, G – ground layer

APPENDIX C QUALIFICATION, LICENSING AND CERTIFICATION

Alexander Fraser

alohafraser@gmail.com | 0423238193 | 665 The Scenic Rd Macmasters Beach, NSW 2251

Key skills

- 12+ years private ecological consulting (Fraser Ecological Consulting)
- 15 + years local government ecological assessment for DAs (Hornsby Shire Council – current employer)
- 10 + years Land & Environment Court expert witness experience
- 2 years state government ecological assessment (NSW OEH)
- High level botanical field identification skills, plot surveys and project management
- Fauna survey and field assistant experience
- Biodiversity Assessment Reporting (BDAR) preparation and Stewardship Site (BSAR) under the NSW BOS Credit Scheme

Qualifications

Bachelor Environmental Science (Honours) Southern Cross University

Certificate 3 Natural Area Restoration

Certificate 3 Vertebrate Animal Pest Control (NSW DPI, Orange)

NPWS Scientific Licence - S10445

Animal Ethics Authority - 11/4299

Accredited under the Biodiversity Assessment Methodology - BAM (Accreditation No. BAAS18156)

Practising member of NSW Ecological Consultants Association (ECA)

Summary

Alex Fraser (Principal Ecologist, Fraser Ecological) has extensive experience in DA related ecological assessment as both an assessor (Hornsby Shire Council) and private consultancy (Fraser Ecological) which actively and currently involve a wide array projects. Fraser Ecological is based locally on the Central Coast, however, project experience extends to South Coast, Blue Mountains, Mid-north Coast and mainly in the Sydney Basin Bioregion.

Previous work roles include ecological consulting for Parsons Brinckerhoff (large infrastructure), NPWS threatened species unit (biodiversity surveys), former NSW Department of Climate Change/ OEH (SIS DGRs and major projects assessment) and Hornsby Shire Council (DA assessment officer) have focussed primarily on ecological survey, development assessment, project management and policy development for consent authorities.

Alex offers high level botanical ID and field survey skills which includes targeted surveys and BAM plot surveys. Fraser Ecological has extensive experience in the preparation of over 15 BDARs under the new BC Act 2016 BOS credit trading scheme. Alex has experience dealing with consent authorities including Council, Crown Lands, Metropolitan Land Council, RFS, Biodiversity Conservation Trust and Department of Planning for major projects including SSDI proposals.

Fraser Ecological has established a wide network of ecological specialists including the Royal Botanic Gardens and Australian Museum as well academic institutions for expert advice when required. Alex is a current member of the North Sydney Regional Land Managers Group that includes staff from Central Coast Council, Northern Beaches, Ku-ring-gai Council, Hornsby Council (HSC), NPWS and Crown Lands) as project manager developing the Natural Area Recreation Strategy for HSC. Current main role at Council is development assessment and review of Flora and Fauna Reports and Biodiversity Assessment Reports.

Fraser Ecological has been engaged by various Councils (Central Coast, Ku-ring-gai, Liverpool City, Blacktown City Council, Hornsby Shire Council and Hawkesbury City Council) to undertake biodiversity assessments for major civil works projects. He is continuously providing biodiversity assessments for private clients for a range od development proposals across coastal and western NSW. We have also undertaken threatened flora and fauna species survey and monitoring for the NSW OEH Save our Species grants.

Key skills:

- Targeted flora and fauna surveys
- BAM plots in accordance with the BAM
- Ecological monitoring & Opportunity and Constraints mapping
- Preparation of BDARs, BAM calculator and credit reporting
- Retirement of credits for approved projects via BCT and brokers
- Establishment of stewardship sites and other offset packages
- Expert witness reporting and attendance in the LAEC
- Compliance investigations and auditing
- Preparation of Vegetation Management Plans
- Preparation of Nestbox Monitoring Plans

CERTIFICATE OF ACCREDITATION AS A BIODIVERSITY ASSESSMENT METHOD ASSESSOR under the *Biodiversity Conservation Act 2016* (NSW)

BAM Assessor		
Alexander Fraser		
Accreditation number	**Accreditation date (Date of issue)**	**Expiry Date of**
BAAS18156	17 October 2021	17 October 2024

The person named above is accredited under section 6.10 of the *Biodiversity Conservation Act 2016* (NSW) (**BC Act**) as a Biodiversity Assessment Method Assessor to apply the Biodiversity Assessment Method in connection with the preparation of biodiversity stewardship site assessment reports, biodiversity development assessment reports and biodiversity certification assessment reports pursuant to Part 6 of the BC Act.

The accreditation is in force until and including the Expiry Date. The accreditation is subject to the conditions set out in the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*, under the BC Act, and the conditions specified on the reverse of this certificate.

LUCIAN MCELWAIN

Manager Ecosytem Programs
Department of Planning, Industry & Environment

NOTES

- DPIE maintains a register of Accredited Biodiversity Assessment Method (BAM) Assessors accessible from the DPIE website.
- The BAM Assessor's accreditation expires on the Expiry Date unless renewed in accordance with the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*. It is the BAM Assessor's responsibility to monitor the Expiry Date of their accreditation, and apply for any renewal with sufficient time for the application to be processed prior to the Expiry Date.
- Words and expressions used in this accreditation instrument and which are also used in the Act have the same meaning.

SUMMARY OF CONDITIONS UNDER SCHEME

The following are conditions of all accreditations granted under the Scheme:

1. an accredited person must prepare Biodiversity Assessment Reports (and conduct surveys and other activities in connection with the preparation of such reports) in accordance with:
   a. the Biodiversity Assessment Method Manual,
   b. the Credit Calculator Operational Manual,
   c. Accredited Person Code of Conduct.
   d. this Scheme,
   e. any guidance materials published by the Department of Planning, Industry and Environment in connection with preparation of Biodiversity Assessment Reports or the application of the BAM
   f. any accreditation requirements notified by the Department of Planning, Industry and Environment to the accredited assessor from time to time.
2. an accredited person must maintain a detailed and up to date working knowledge of, and comply with, all relevant legislation.
3. an accredited person must maintain records of surveys and assessments, including field data sheets and targeted flora and fauna surveys, undertaken and used as part of the preparation of a Biodiversity Assessment Report, for at least ten years after certification of the relevant Biodiversity Assessment Report.
4. all records required kept by an accredited person must be in legible form, or in a form that can be readily be reduced to a legible form.
5. an accredited person must provide to the Department of Planning, Industry and Environment any information related to biodiversity assessment reports required to be provided by all accredited persons, or by a group of accredited persons, by way of a notice specified on a website maintained by it, in the form and within the time frames required in that notice.
6. an accredited person must comply with any scientific licence conditions relating to survey records.
7. an accredited person must possess, or operate under, an appropriate scientific licence as required for the type work, they are completing in the Biodiversity Offsets Scheme.

Note. Information that the Environment Agency Head (EAH) may require to be provided may include information collected during the application of the BAM such as site specific survey data.

Note. In addition to the conditions above, accredited persons must comply with obligations under the BC Act and regulations, including Part 6 Division 3 of the BC Act. Failure to comply with any of the conditions above may result in the EAH exercising the power to vary, suspend or cancel that accreditation under Part 5 of this Scheme.

Level 2, 338 Pitt Street,
Sydney NSW 2000
Phone: 1300 249 268

Certificate of Currency

Professional Indemnity

This Certificate:

- is issued as a matter of information only and confers no rights upon the holder;
- does not amend, extend or alter the coverage afforded by the policy listed;
- is only a summary of the cover provided. For full particulars, reference must be made to the current policy wording;
- is current only at the date of issue.

Name of Insured	Alex Fraser Trading As Fraser Ecological Consulting (ABN: 79763740114)
Occupation	Consultancy Occupations • Environmental Consulting
Policy Number	S0B/18206/000/22/N
Policy Period	4.00pm Local Standard Time on 28 June 2022 to 4.00pm Local Standard Time on 28 June 2023
Limit of Indemnity	Professional Indemnity : AUD$5,000,000 any one claim and in the aggregate. The overall aggregate limit is subject to the number of reinstatements on the policy.
Excess	Professional Indemnity : AUD$0 each and every claim.
Reinstatements	1
Interested Party	None Noted
Underwriter	DUAL Australia Pty Ltd on behalf of certain underwriters at Lloyd's in accordance with the authorisation granted under Unique Market Reference Number: B1736DU2200001
Signature	
Name of Signatory	Michael Gottlieb (BizCover)
Capacity/Title	Director
Date	20 Oct 2022

Please note
This Certificate is issued subject to the policy's terms and conditions and by reference to the insured's declaration. The information set out in this Certificate is accurate as at the date of signature and there is no obligation imposed on the signatory to advise of any alterations.

Level 2, 338 Pitt Street,
Sydney NSW 2000
Phone: 1300 249 268

Certificate of Currency

Public Liability

This Certificate:

- is issued as a matter of information only and confers no rights upon the holder;
- does not amend, extend or alter the coverage afforded by the policy listed;
- is only a summary of the cover provided. For full particulars, reference must be made to the current policy wording;
- is current only at the date of issue.

Name of Insured	Alex Fraser Trading As Fraser Ecological Consulting (ABN: 79763740114)
Policy Number	PB/27002/000/22/N
Policy Period	4.00pm Local Standard Time on 28 June 2022 to 4.00pm Local Standard Time on 28 June 2023
Interest Insured	Public Liability
Situation	665 The Scenic Road, MACMASTERS BEACH, NSW, 2251
Sum Insured	**Public Liability:** $10,000,000
Interested Party	None Noted
Underwriter	DUAL Australia Pty Ltd on behalf of certain underwriters at Lloyd's in accordance with the authorisation granted under Unique Market Reference Number: B1736DU2200001
Signature	
Name of Signatory	Michael Gottlieb (BizCover)
Capacity/Title	Director
Date	20 Oct 2022

Please note
This Certificate is issued subject to the policy's terms and conditions and by reference to the insured's declaration. The information set out in this Certificate is accurate as at the date of signature and there is no obligation imposed on the signatory to advise of any alterations.

ECA ECOLOGICAL CONSULTANTS ASSOCIATION of NSW Inc

2023 PRACTISING MEMBER

APPENDIX D BAM SUMMARY REPORTS

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00029703/BAAS18156/21/00029704

Proposal Name
1020 MELIA COURT CASTLE HILL

BAM data last updated *
22/06/2023

Assessor Name
Alex FRASER

Assessor Number
BAAS18156

BAM Data version *
61

Proponent Names
Basil Lim

Report Created
06/02/2024

BAM Case Status
Finalised

Assessment Revision
4

Assessment Type
Part 4 Developments (General)

Date Finalised
06/02/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3136-Blue Gum High Forest

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
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	HBT Cr	No HBT Cr	Total credits to be retired
3136-Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	2.0	0	8	8

BAM Biodiversity Credit Report (Like for like)

3136-Blue Gum High Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_ZoneAPoor	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_ZoneBMod	No	8	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00
Ninox strenua / Powerful Owl	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00
Pommerhelix duralensis / Dural Land Snail	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00

BAM Biodiversity Credit Report (Like for like)

Credit Retirement Options

Like-for-like credit retirement options

Callocephalon fimbriatum / Gang-gang Cockatoo	Spp	IBRA subregion
	Callocephalon fimbriatum / Gang-gang Cockatoo	Any in NSW
Ninox strenua / Powerful Owl	Spp	IBRA subregion
	Ninox strenua / Powerful Owl	Any in NSW
Pommerhelix duralensis / Dural Land Snail	Spp	IBRA subregion
	Pommerhelix duralensis / Dural Land Snail	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00029703/BAAS18156/21/00029704

Proposal Name

1020 MELIA COURT CASTLE HILL

BAM data last updated *

22/06/2023

Assessor Name

Alex FRASER

Assessor Number

BAAS18156

BAM Data version *

61

Proponent Name(s)

Basil Lim

Report Created

06/02/2024

BAM Case Status

Finalised

Assessment Revision

4

Assessment Type

Part 4 Developments (General)

Date Finalised

06/02/2024

BOS entry trigger

BOS Threshold: Biodiversity Values Map

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3136-Blue Gum High Forest

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
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	HBT Cr	No HBT Cr	Total credits to be retired
3136-Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	2.0	0	8	8.00

3136-Blue Gum High Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_Zone APoor	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_Zone BMod	No	8	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00
Ninox strenua / Powerful Owl	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00
Pommerhelix duralensis / Dural Land Snail	**3136_ZoneAPoor, 3136_ZoneBMod**	1.9	10.00

Credit Retirement Options

Like-for-like options

<table>
<tr><td rowspan="5">Callocephalon fimbriatum/
Gang-gang Cockatoo</td><td>Spp</td><td colspan="2">IBRA region</td></tr>
<tr><td>Callocephalon fimbriatum/Gang-gang Cockatoo</td><td colspan="2">Any in NSW</td></tr>
<tr><td colspan="3">Variation options</td></tr>
<tr><td>Kingdom</td><td>Any species with same or higher category of listing under Part 4 of the BC Act shown below</td><td>IBRA region</td></tr>
<tr><td>Fauna</td><td>Vulnerable</td><td>Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo.
or
Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</td></tr>
<tr><td rowspan="2">Ninox strenua/
Powerful Owl</td><td>Spp</td><td colspan="2">IBRA region</td></tr>
<tr><td></td><td colspan="2"></td></tr>
</table>

	Ninox strenua/Powerful Owl		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pommerhelix duralensis/ Dural Land Snail	Spp		IBRA region
	Pommerhelix duralensis/Dural Land Snail		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Candidate Species Report

Proposal Details

Assessment Id 00029703/BAAS18156/21/00029704	Proposal Name 1020 MELIA COURT CASTLE HILL	BAM data last updated * 22/06/2023
Assessor Name Alex FRASER	Report Created 06/02/2024	BAM Data version * 61
Assessor Number BAAS18156	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 4	Date Finalised 06/02/2024	BOS entry trigger BOS Threshold: Biodiversity Values Map

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List of Species Requiring Survey

Name	Presence	Survey Months
Callocephalon fimbriatum Gang-gang Cockatoo	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox strenua Powerful Owl	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pommerhelix duralensis Dural Land Snail	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

BAM Candidate Species Report

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Refer to BAR
Bush Stone-curlew	Burhinus grallarius	Refer to BAR
Eastern Australian Underground Orchid	Rhizanthella slateri	Refer to BAR
Eastern Pygmy-possum	Cercartetus nanus	Refer to BAR
Glossy Black-Cockatoo	Calyptorhynchus lathami	Refer to BAR
Green and Golden Bell Frog	Litoria aurea	Refer to BAR
Grey-headed Flying-fox	Pteropus poliocephalus	Refer to BAR
Koala	Phascolarctos cinereus	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Refer to BAR
Large-eared Pied Bat	Chalinolobus dwyeri	Refer to BAR
Little Bent-winged Bat	Miniopterus australis	Refer to BAR
Magenta Lilly Pilly	Syzygium paniculatum	Refer to BAR
Masked Owl	Tyto novaehollandiae	Refer to BAR
P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	Pomaderris prunifolia - endangered population	Geographic limitations
Persoonia mollis subsp. maxima	Persoonia mollis subsp. maxima	Refer to BAR
Red-crowned Toadlet	Pseudophryne australis	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Refer to BAR
Scrub Turpentine	Rhodamnia rubescens	Refer to BAR
Square-tailed Kite	Lophoictinia isura	Refer to BAR
Squirrel Glider	Petaurus norfolcensis	Refer to BAR
Swift Parrot	Lathamus discolor	Refer to BAR
White-bellied Sea-Eagle	Haliaeetus leucogaster	Refer to BAR

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00029703/BAAS18156/21/00029704	1020 MELIA COURT CASTLE HILL	22/06/2023
Assessor Name	Report Created	BAM Data version *
Alex FRASER	06/02/2024	61
Assessor Number	BAM Case Status	Date Finalised
BAAS18156	Finalised	06/02/2024
Assessment Revision	Assessment Type	BOS entry trigger
4	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map

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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Blue Gum High Forest												
1	3136_ZoneAPoor	Blue Gum High Forest in the Sydney Basin Bioregion	11.3	11.3	0.65	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
2	3136_ZoneBMod	Blue Gum High Forest in the Sydney Basin Bioregion	19.2	9.3	1.3	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	8
											Subtotal	**8**
											Total	**8**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Callocephalon fimbriatum / Gang-gang Cockatoo (Fauna)									
3136_ZoneAPoor	11.3	11.3	0.64	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Endangered	False	4
3136_ZoneBMod	9.3	9.3	1.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Endangered	False	6
								Subtotal	**10**

Ninox strenua / Powerful Owl (Fauna)									
3136_ZoneAPoor	11.3	11.3	0.64	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
3136_ZoneBMod	9.3	9.3	1.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
								Subtotal	**10**
Pommerhelix duralensis / Dural Land Snail (Fauna)									
3136_ZoneAPoor	11.3	11.3	0.64	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Endangered	False	4
3136_ZoneBMod	9.3	9.3	1.3	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Endangered	False	6
								Subtotal	**10**

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00029703/BAAS18156/21/00029704	1020 MELIA COURT CASTLE HILL	22/06/2023
Assessor Name	**Report Created**	**BAM Data version ***
Alex FRASER	06/02/2024	61
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18156	Part 4 Developments (General)	Finalised
Assessment Revision	**Date Finalised**	**BOS entry trigger**
4	06/02/2024	BOS Threshold: Biodiversity Values Map

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3136_ZoneAPoor	3136-Blue Gum High Forest	ZoneAPoor	0.65	1	

2	3136_ZoneBMod	3136-Blue Gum High Forest	ZoneBMod	1.3	1	