ACS Environmental Pty Ltd

FLORA AND FAUNA SURVEYS

AND

AND BIODIVERSITY IMPACT ASSESSMENT

FOR

PROPOSED DEVELOPMENT

AT

13 BUNGENDORE ROAD,

INGLESIDE, NSW, 2101

PREPARED FOR:

MR JOHN HOLMAN
13 BUNGENDORE ROAD,
INGLESIDE, NSW, 2101

AUGUST 2020

ACS Environmental Pty Ltd

Flora and Fauna Surveys, Biodiversity and Ecological Impact Assessment and Bushland Plans of Management Services

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EXECUTIVE SUMMARY

In July 2020, ACS Environmental was commissioned by Mr John Holman of 13 Bungendore Street, Ingleside, NSW, to survey for flora and fauna and undertake a biodiversity impact assessment for a proposed DA to convert an existing Farm Building to a Farm Stay Accommodation Building.

The total area of the subject land including the proposed development site is estimated at about 2.6ha Much of the land has been largely cleared of most native understorey and ground stratum vegetation structure.

Clearing in accordance with the 10/50 Rule (RFS NSW 2015) in compliance with bushfire protection has been undertaken such that an APZ (IPA) has been established where no canopy trees occur closer than 10m from the current farm building. All shrubs have been removed from within the ground stratum for the prescribed IPA for the building, the APZ distances at all compass points being less than 50m from the building in compliance with Protection for Bushfire Planning (*PfBP*) 2006. The cleared ground stratum has been top-dressed with at least 100mm of topsoil and sown to low growing pasture grass cover species such as Winter Grass, Perennial Ryegrass and Common Couch (Figure 1).

The general vegetation of the subject land along the slope consists of remnant sparsely located canopy trees including mostly Sydney Red Gum (*Angophora costata*) and Broad-leaved White Mahogany (*Eucalyptus umbra*), retained across a sloping area of introduced exotic grassland (Figures 1 & 2). The exotic grassland is comprised mainly of Winter Grass (*Poa annua*), Perennial Rye Grass (*Lolium perenne*) and Common Couch (*Cynodon dactylon*).

The subject site contains a ground cover of cleared exotic grassland sown on top-dressed soil overlying natural substrates including extensive rock outcropping, ledges and exposed sandstone rock platforms (Holman *pers comm.*).

A total of 27 indigenous plant species, and except for the most dominant canopy species, these occurred at very low frequency and at a very low percentage cover over the subject area surveyed. A total of 5 indigenous canopy tree species occur at the subject site including mostly semi-mature individuals of Sydney Red Gum, Broad-leaved White Mahogany and Grey Gum.

It is assessed that the ecological community pertaining to the subject site is Sydney North Exposed Sandstone Woodland rather than Sydney Ironstone Red-Bloodwood - Silvertop Ash Forest in respect of the following features (detailed in Table 1).

In regard to physical landscape features including:

- Hillside position on sideslope rather than on crest or ridge topography is more indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (OEH 2016; Smith & Smith 2000),
- Extent of rock outcropping is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (OEH 2016; Smith & Smith 2000),
- Absence of any ironstone mantle sediments in the upper soil layers is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (OEH 2016; Smith & Smith 2000), and

Floristic attributes including:

- Dominance of Sydney Red Gum and Broad-leaved White Mahogany in canopy assemblage is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (OEH 2016; Smith & Smith 2000),
- Low Index value for Duffy's Forest Index for the assessed vegetation assemblage is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (Smith & Smith 2000),
- Presence of negative diagnostic species for Duffys Forest in recorded assemblage including *Eucalyptus punctata; Schoenus imberbis; Woollsia pungens* and *Eriostemon australasius* is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest (Smith & Smith 2000), and

Previous and current mapping in relation to subject site is indicative of Sydney North Exposed Sandstone Woodland rather than Duffys Forest including from:

- DPIE (2020);
- OEH (2016); and
- Smith & Smith (2000),

These physical and floristic attributes pertaining to the location and floristic assemblage occurring at the subject site, as well as the documented vegetation mapping prepared by DPIE (2020), OEH (2016) and Smith & Smith (2000), indicate that the subject site, though structurally and floristically compromised by clearing in respect of the 10/50 Rule (NSW RFS 2015) to afford bushfire protection to the current buildings, is more likely to contain an assemblage of Sydney North Exposed Sandstone Woodland with some elements of Coastal Sandstone Gully Forest rather than Sydney Ironstone Red Bloodwood - Silvertop Ash Forest (Duffys Forest).

The Sydney North Exposed Sandstone Woodland ecological community is well represented in a number of conservation reserves of northern Sydney such as Ku-ring-gai Chase and Garigal National Parks, as well as in the Central Coast hinterland (OEH 2016).

The community as described by OEH (2016) and DPIE (2020) is not listed on registers of the BC Act (2016) or the Commonwealth EPBC Act (1999).

As the natural ground surface has been cleared of vegetation and has been top-dressed with a substantial depth of introduced soil and grass cover, it is considered highly unlikely that any natural vegetation will regrow from seed or underground vegetative stems or rootstock as stated in relation to Recovering Bushland on the Cumberland Plain (DEC 2005). It is accepted that if a site has been cleared and continually cultivated with exotic grassland, it will have little if any resilience (DEC 2005) (Figures 5 & 6).

To maintain a 10/50 bushfire protection zone (NSW RFS 2015), it is recommended that a bushfire management plan be prepared to ensure bushfire protection is afforded to the property in perpetuity and that clearing for the 10/50 Rule is implemented.

No trees within the IPA area (Figure 2) were observed to contain any hollows or spouts suitable for sheltering or breeding for small avifauna or microbats. As such, it is recommended that at least 2 nest boxes suitable for medium sized birds and two bat boxes could be installed about 10m on trunks of existing trees in suitable locations to provide such habitat for these fauna.

Atlas of NSW Wildlife data records for an area of 5km radius around the subject site indicate that 15 flora species of conservation significance have been recorded within the last 20 years.

Habitat at the highly floristically and structurally modified subject site does not appear to be suitable for any of these species. DEC (2005) note that if a site has been cleared and continually cultivated with exotic grassland, it will have little if any resilience and former native species will likely not regrow through the cultivated sown pasture grass cover (Figures 5 & 6).

Comprehensive targeted searches for conspicuous, mostly large life-form species in the highly structurally and floristically modified assemblage of the study area did not locate these, or any other threatened flora species, in the subject area.

As such, none of the threatened flora species recorded within a 5km radius of the subject site occurs, or was expected to occur, at or in the vicinity, of the subject site.

The OEH Atlas of NSW Wildlife database 2019 recorded thirty eight (38) species of terrestrial and avifauna listed as threatened under the BC Act within a 5 km radius of the site. None of these threatened fauna species have been recorded within a 1km of the subject site.

Due to the highly modified structural and floristic habitat of the IPA within the subject site (Figures 5 & 6), no threatened fauna species are considered likely to regularly occur

as indicated by the recorded sightings of threatened fauna species in the locality. Figures 12 & 13 indicate the located sightings of the most recorded threatened fauna species within a 10km area surrounding the subject site within the last 20 years (DPIE 2020).

In regard to threatened species legislation, the proposed development is considered to comply with the desired criteria in relation to The Pittwater Council LEP (2014) and Pittwater 21 Council DCP (2014).

The aims of the LEP (2014) and Pittwater 21 DCP (2014) is to ensure that controls relating to biodiversity conservation and vegetation and wildlife management are undertaken when any development is proposed in areas containing natural bushland. The objective to maintain terrestrial biodiversity aims to ensure the following:

- protection of native fauna and flora,
- protection of ecological processes necessary to maintain their continued existence, and
- the encouragement of the conservation and recovery of native fauna and flora and their habitats.

This aim serves to protect and conserve the biodiversity of the local area through the retention of natural vegetation where applicable and to maintain, enhance and/or establish wildlife corridors that enable existing plant and animal communities to survive and potentially expand their range where possible (Pittwater Council 21 DCP 2014).

In regard to the proposed development, the land is already highly modified, floristically, structurally and in functionality, where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land, or act to further fragment or diminish the current biodiversity elements of the subject land.

It is considered that the development would be highly unlikely to have an adverse effect on the life cycle of any individual threatened flora or fauna species or their respective habitat. It is considered that for potential impacts to any threatened ecological communities or threatened flora or fauna, concurrence from the Director General of the Office of Environment and Heritage is not required, nor is a Species Impact Statement necessary for the proposed development.

Environmental criteria in relation to requirement for biodiversity offsets is assessed as follows:

- The area of property and area proposed for development is less than 0.5ha, an area too small to trigger offsets;
- The subject land is not marked on the Biodiversity Values Map as containing any significant biodiversity value (Figure 12) and so not triggering biodiversity offsets; and
- It is assessed and considered that no threatened species (of both flora and fauna) would be significantly impacted by the proposed development at the subject land.
- From established and assessed physical attributes of the landform and floristic attributes of the remnant vegetation, it appears highly likely that the ecological community pertaining to the subject site is a structurally and floristically modified assemblage of Sydney North Exposed Sandstone Woodland vegetation and does not conform to the definition of Duffys Forest. As such, this proposed development based on threatened species occurrence and potential impacts of development is considered not to trigger the offsets scheme.

A such, it is considered that biodiversity offsets in relation to the development are not required.

GLOSSARY AND ACRONYMS

APZ - Asset Protectrion Zone

BAM - Biodiversity Assessment Method (2017) - supports the BC Act (2016).

BC Act - *Biodiversity Conservation Act (2016)* - legislation enacted in August 2017

CEEC - Critically Endangered Ecological Community

DAWE - Commonwealth Department of Agriculture, Water and Environment

DPIE - Department of Planning, Industry and Environment

E (threatened species status) - Endangered species

EEC - Endangered Ecological Community as listed by the BC Act and EPBC Act

EPBC Act - Environmental Protection & Biodiversity Conservation Act (1999). Enacted to protect and manage nationally and internationally (migratory) flora, fauna and ecological communities, defined in the Act as matters of national environmental significance (NES)

Habitat - areas occupied, either territorially, periodically or occasionally, by a species, population or ecological community

IPA - Inner Protection Area

KTP - Key threatening process, a process that threatens the survival, life cycle, abundance or potential evolutionary development of native species, populations or ecological communities (Dept of Environment and Conservation 2004). KTP's are listed under the BC Act and the EPBC Act.

Migratory species - listed under the EPBC Act and relating to international agreements to which Australia is a signatory. Includes the Japan-Australia Migratory Bird Agreement (JAMBA), Chine-Australia Migratory Bird Agreement (CAMBA) Republic of Korea Migratory Bird Agreement (ROKAMBA)

OEH - State Office of Environment and Heritage

OPA - Outer Protection Area

PCT - Plant Community Type identified as such using the Bionet Vegetation Classification system (OEH 2018)

RoTAP - Rare or Threatened Australian Plants

Threatened species, populations or ecological communities - Entities listed by the BC Act and EPBC Act as 'Vulnerable to decreasing population growth in time', Endangered as population growth decreasing rapidly leading to eventual extinction' or 'Critically Endangered, a more extreme rate of population decrease than the former'.

V (threatened species status) - Vulnerable

INTRODUCTION

1.1 Proposed development

In July 2020, ACS Environmental was commissioned by Mr John Holman of 13 Bungendore Street, Ingleside, NSW, Australia to survey for flora and fauna and undertake a biodiversity impact assessment for a proposed DA to convert an existing Farm Building to a Farm Stay Accommodation Building.

The total area of the subject land including the proposed development is estimated at about 2.6ha Much of the land has been largely cleared of most native understorey and ground stratum vegetation structure.

The proposal is to convert the current Farm Building to a Farm Stay Accommodation Building, a type of 'tourist and visitor accommodation' occurring within a prescribed IPA (Nolan Planning Consultants 2019).

Figure 1 is an aerial view of the subject site indicating the cleared landscape which conforms to approved IPA and BCA standards (Fenwick 2019, Doherty 2019, Fomin 2020, Harris 2020, O'Toole 2020).

Figure 2 is an aerial view of the subject land showing current development on and adjacent to the land, with areas indicating the assessed IPA configuration and demarcation of the 10/50 Rule boundaries.

The existing Farm Building is located on the Eastern side of the property with a setback of 20.7m from the eastern boundary and 21.24m from the common boundary with No. 11 Bungendore Street. The footprint of the existing farm building is 100m² with an additional 24m² patio (i.e. 124m² in total). The Farm Building and Patio were designed and built by John Holman (a professional engineer) as Exempt Development under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 to BAL 40 Standard (Nolan Planning Consultants 2019).

The proposal seeks to change the existing use as a farm building to ‘farm stay accommodation’ comprising two units of accommodation. The ground level unit comprises two bedrooms, kitchen, living room, patio and bathroom/laundry and is designed to be accessible as per AS1428.1 (i.e. disabled access). There is also a disabled parking space proposed with flat access to the ground floor unit, along with an additional two standard parking spaces. The top floor unit comprises one bedroom, media room, kitchen and living/meals room and bathroom/laundry (Nolan Planning Consultants 2019).

All collected stormwater currently discharges to an existing 50,000L water tank which provides water to the farm stay accommodation. Currently the sewage from the

building's existing bathroom/laundry runs into the existing on-site sewage disposal system. This DA proposes to change this situation so the sewage will run into a new on-site sewage disposal system (Nolan Planning Consultants 2019).

The proposal does not require the removal of any vegetation.

Figure 3 is a schematic site plan of the subject land indicating the topography and general slope of the subject land (Bee & Lethbridge 2020).

Figure 4 is an aerial depiction of the subject area showing the land in relation to established development in the local area (SIXmaps 2020).

1.2 Application of the 10/50 Rule (NSW RFS 2015; NSW Government 2018)

This survey relates particularly to the area of the APZ as determined by several Bushfire Experts (Fenwick 2019, Doherty 2019, Fomin 2020, Harris 2020, O'Toole 2020) and to the area which extends marginally further from the existing building as determined by the NSW Government publication 'Bush fire related clearing and the Biodiversity Conservation Act 2016' (published in 2018 with further information available at 'https://www.rfs.nsw.gov.au/plan-andprepare/1050-vegetation-clearing').

Bush fire related clearing in relation to the Biodiversity Conservation Act 2016 states that 'in areas where the 10/50 Vegetation Clearing Code of Practice applies, a clearing entitlement will be created by the approval of certain buildings and structures. An APZ approved in association with the development may be larger or smaller than the 10/50 clearing entitlement (Figure 2). Regardless, an approved APZ will not extinguish the 10/50 entitlement. However, clearing under the 10/50 Code cannot be inconsistent with a condition of development consent that identifies and requires the retention and management of vegetation for conservation purposes. To take this clearing entitlement into account in biodiversity assessments and approvals, Council could either:

- Apply a 50 metre buffer around eligible buildings where the 10/50 Vegetation Clearing Code of Practice applies for the purposes of determining whether a biodiversity development assessment report is required; or

- Apply the appropriate APZ for the purposes of determining whether a biodiversity development assessment report is required and then apply a condition of consent to protect vegetation beyond the APZ that identifies and requires the retention and management of vegetation for conservation purposes.

If a landowner has an approved APZ or a 10/50 clearing entitlement relating to an existing building, approved clearing in these areas does not need to be considered in determining whether a biodiversity development assessment report is required for a subsequent development application. Any vegetation impacted by a proposed

development that is within the 10/50 clearing entitlement of a neighbour's building will be considered when determining whether a biodiversity development assessment report is required. An exception may be made if the applicant presents a written consent from the neighbour for removal of this vegetation at the time of submission of the development application. A landholder can only remove vegetation on their land that relates to the 10/50 clearing entitlement of a neighbour's building if they have a written consent from the neighbour. A landholder can remove vegetation for an approved APZ that relates to a neighbour's property where the Rural Fire Service's requirements specifically extend into their property from the neighbouring property and these requirements are included in a development consent. For the purposes of determining whether a biodiversity development assessment report is required, this clearing may be excluded from consideration.

Clearing in accordance with the 10/50 Rule (RFS NSW 2015, NSW Government (2018) 'Bush fire related clearing and the Biodiversity Conservation Act 2016') in compliance with bushfire protection has been undertaken such that an APZ (IPA) has been established where no canopy trees occur closer than 10m from the current farm building. All shrubs have been removed from within the ground stratum for the prescribed IPA for the building, the APZ distances at all compass points being less than 50m from the building in compliance with Protection for Bushfire Planning (*PfBP*) 2006. The cleared ground stratum has been top-dressed with at least 100mm of topsoil and sown to low growing pasture grass cover species such as Winter Grass, Perennial Ryegrass and Common Couch (Figure 1).

Figure 1 - Aerial image of current development at 13 Bungendore Street, Ingleside, including cleared areas and canopy distribution (from Nearmaps 2020)

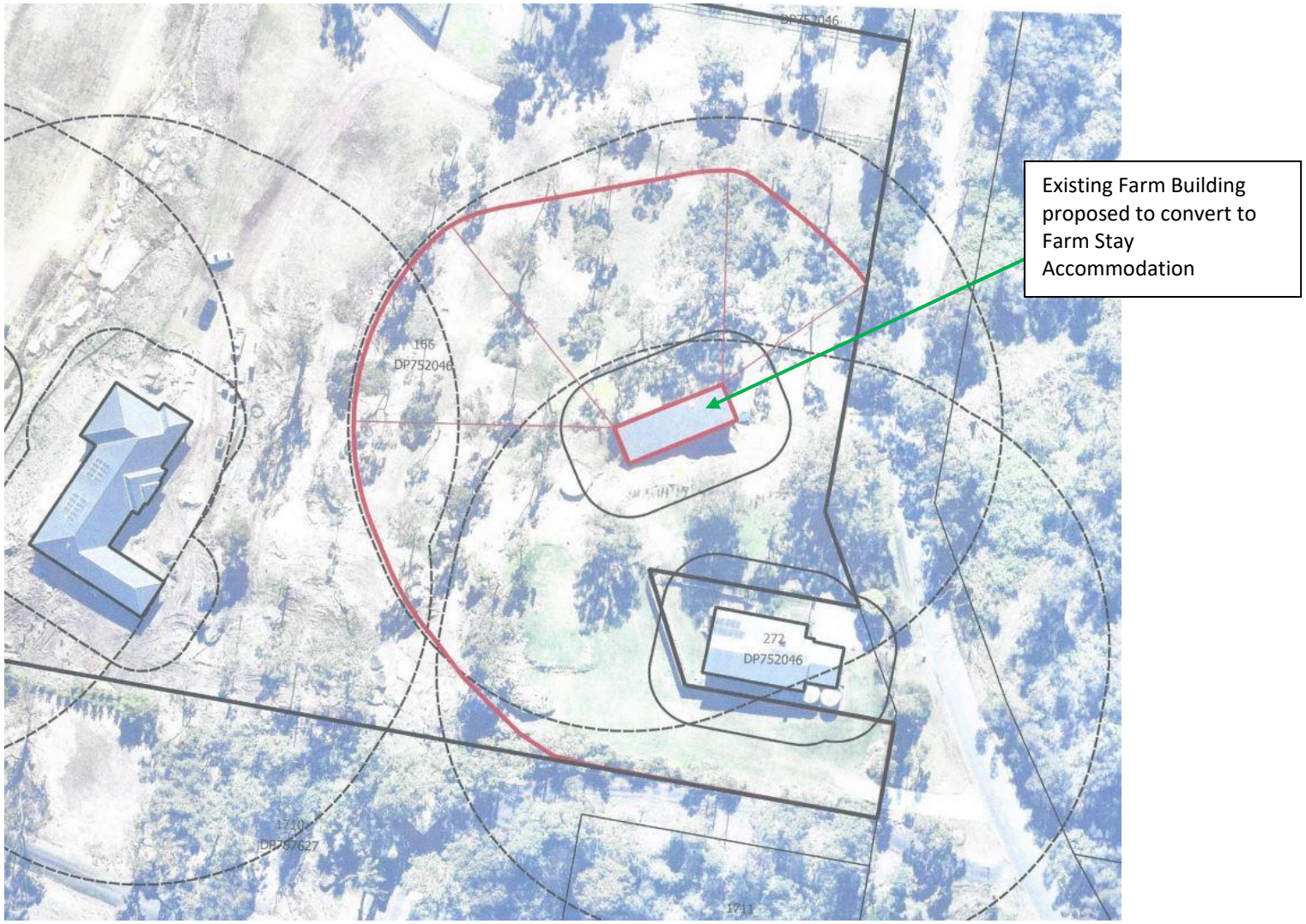

Figure 2 - Aerial image showing location of buildings within and in vicinity of the subject land and indicating the boundaries of the IPA (red outline) which occur within the designated boundaries afforded by the 10/50 Rule (black dashed lines) (NSW RFS 2015, NSW Government 2018)

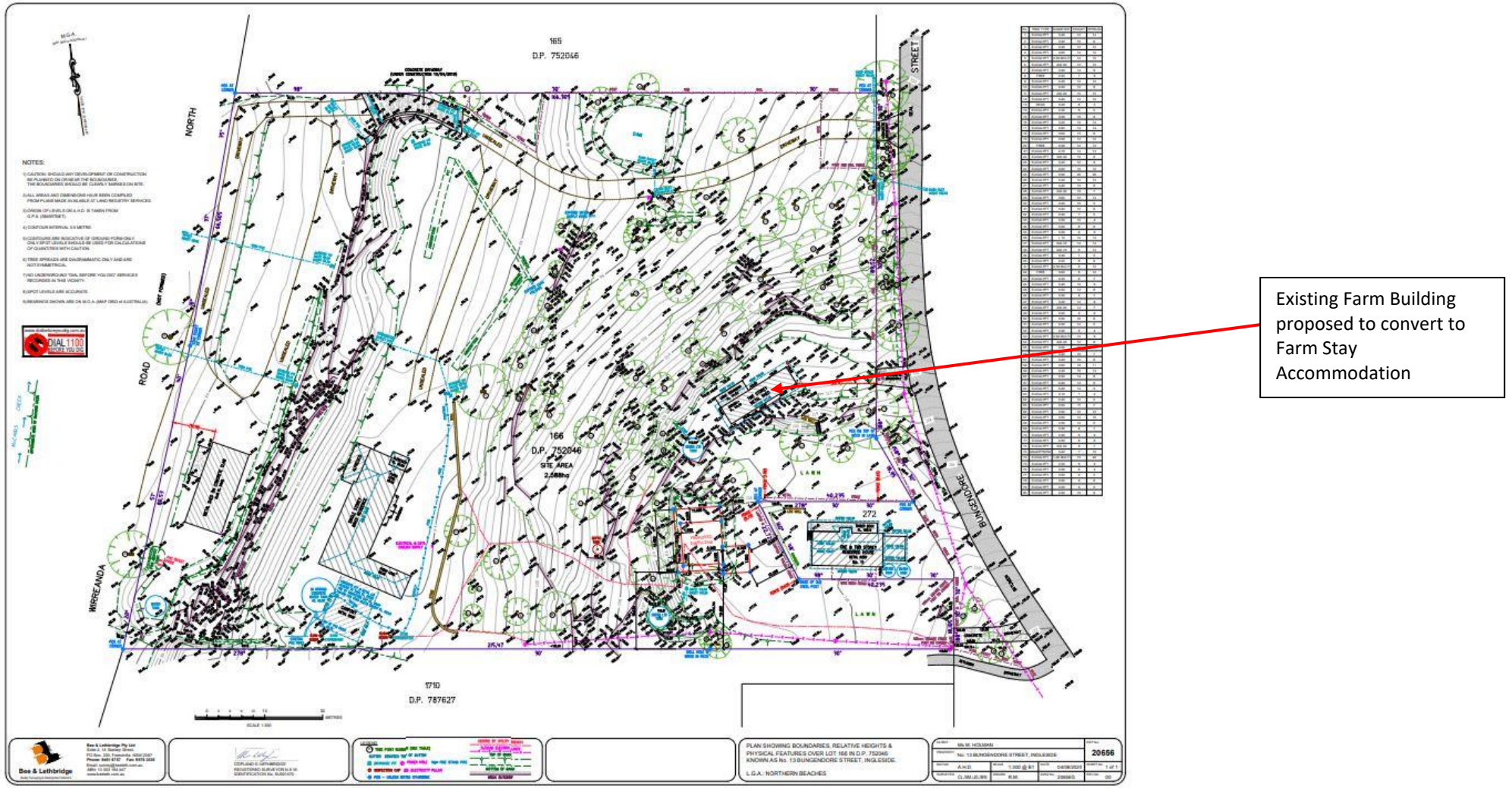

Figure 3 - Schematic site plan of current and proposed dwellings at the subject land, also showing current established trees and contours at the subject land (Bee and Lethbridge 2020)

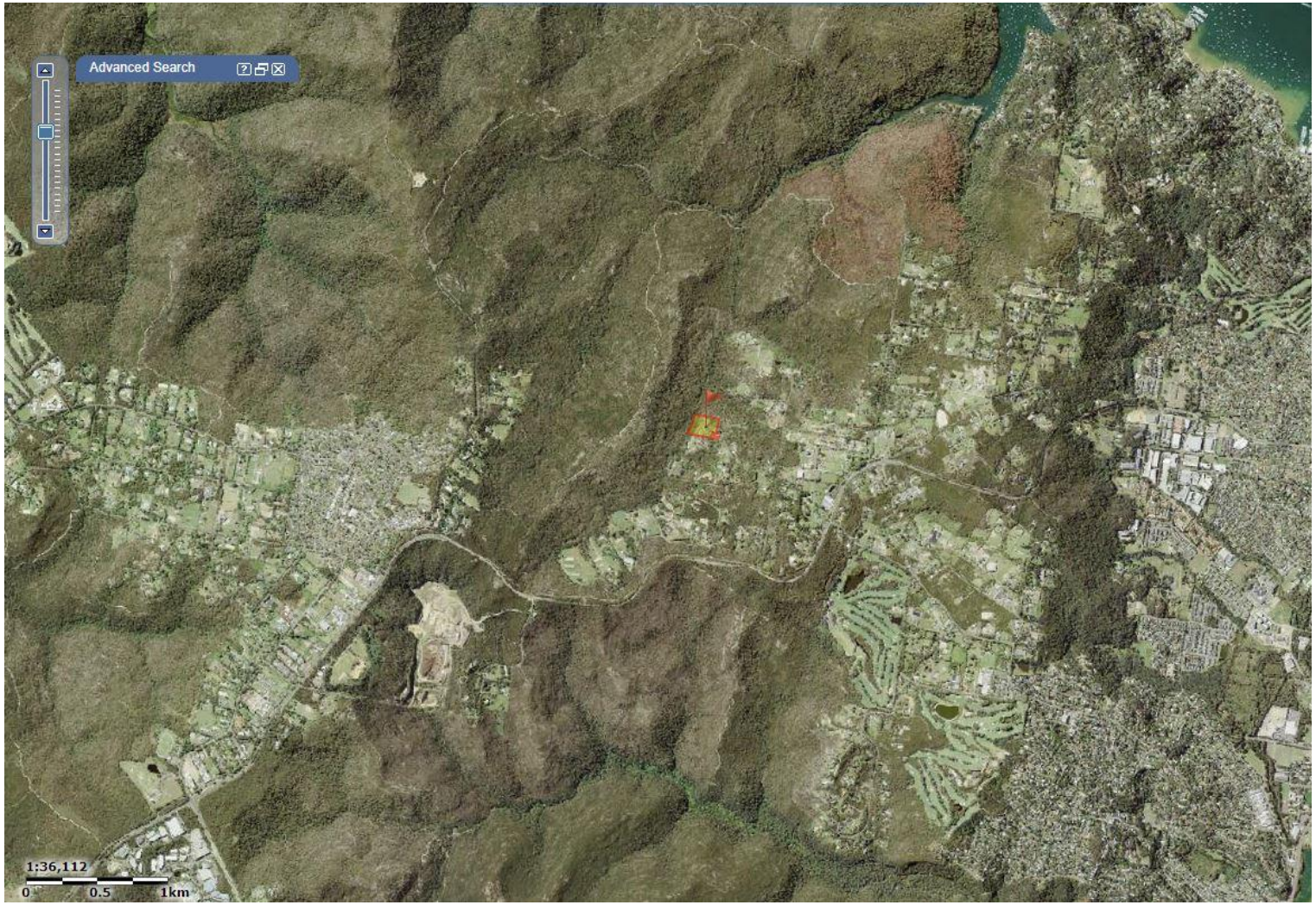

Figure 4 - Aerial view of subject land (bordered in red outline) in relation to development in locality including roads, residential development and waterways (SIXmaps)

1.3 Purpose of biodiversity impact assessment report

The purpose of the flora and fauna surveys and ecological impact assessment is to document existing and expected biota and to ensure all necessary safeguards are described and complied with in relation to the proposal as required by Pittwater LEP 2014 cl. 7.6 Biodiversity.

1.4 Statutory and legislative requirements

Planning controls provided by State and Commonwealth Legislation include the following:

- Environmental Planning and Assessment Act (EP & A Act) (1979),
- Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act) (1999),
- Biodiversity Conservation Act (BC Act) (2016). The BC Act (2016) includes Preliminary Determinations of the NSW Scientific Committee (to August 2020) as well as Provisional Listings of Endangered Species on an emergency basis (to August 2020),

  The objectives of this Act are:

  - to provide for the conservation of threatened species, populations and ecological communities of animals and plants. The Act sets out a number of specific objects relating to the conservation of biological diversity and the promotion of ecologically sustainable development.
- Planning for Bushfire Protection (2019).
- Biosecurity Weeds Act 2015 (NSW)

  The objectives of this Act are:
  - to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms to:
  - prevent the establishment in this State of significant new weeds, and
  - restrict the spread in this State of existing significant weeds, and
  - reduce the area in this State of existing significant weeds,
  - to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this State

Local Council planning controls include the:

- Pittwater Local Environment Plan (2014) and Pittwater 21 Development Control Plan (2014)

This flora and fauna assessment report includes an account of:

- Threatened flora and fauna species, populations, endangered ecological communities and their habitats, as listed under the Biodiversity Conservation Act (BC Act), 2016;
- Nationally significant flora species, as listed under the Environment Protection and Biodiversity Conservation Act (EPBC Act), 1999;

- Rare or threatened Australian plants (RoTAP) as listed in Briggs and Leigh (1996); and
- Any regionally or locally significant species in the Northern Beaches Council LGA.

1.5 Documents provided

- Harris Environmental Consulting (2020) Re: Farm Stay (DA2019/1381) - APZ standard for 13 Bungendore Street, Ingleside
- Bee & Lethbridge (2020) Survey Plan of Boundaries, Relative Heights and Physical Features of land at 13 Bungendore Street, Ingleside
- Fomin, N (Planning and Environment Services) (2019) Bushfire Safety Authority for SFPP – Farm Stay Accommodation 13 Bungendore Street INGLESIDE NSW 2101, 166//DP752046
- NSW Building Approvals (2020) BCA Compliance Assessment Report for Proposed Farm Stay Accommodation 13 Bungendore Street, Ingleside
- NSW Government (2018) 'Bush fire related clearing and the Biodiversity Conservation Act 2016'
- Nolan Planning Consultants (2019) Statement of Environmental Effects 13 Bungendore Street, Ingleside - change of use from an existing farm building to farm stay accommodation
- O'Toole, T. (Advanced Bushfire Performance Solutions P/L (2020) Review of APZ at 13 Bungendore Street Ingleside NSW

1.6 Objectives of the study

- To carry out detailed flora and fauna surveys on the subject land;
- To prepare a comprehensive report qualifying potential impacts and describing mitigation measures in relation to the above assessments.

1.7 Scope of the study

The survey work was undertaken to provide John Holman with current and detailed information on the following:

- Identification of the flora and fauna that occur at the subject sites including documentation of species lists and mapping of identifiable plant communities;
- Identification of Threatened (Endangered and Vulnerable) species, populations, communities and habitats as listed in Schedules 1 & 2 of the Biodiversity Conservation Act 2016 (BC Act) including Preliminary Determinations of the NSW Scientific Committee, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), ROTAP species (Briggs & Leigh 1996) and regionally and locally significant species that could potentially be impacted upon by the proposed development;
- Identify listed migratory species (as listed in international treaties referred to in the EPBC Act);

- Identification of fauna species, including species of amphibians, reptiles, birds or mammals, not directly recorded during surveys but that could potentially occur in the study area as indicated by the presence of associated habitat;
- Preparation of a report describing vegetation communities on the subject land indicating their current condition and level of degradation;
- Recording of the area and extent of Biosecurity (and other significant High Threat Exotic) weed species in the study area;
- Assessment of potential impacts of the proposal on existing flora and fauna within the study area;
- Submission of draft report;
- Incorporation of relevant review comments and amendment of draft report; and
- Submission of a final report within 1 week of receiving review comments.

2 EXISTING ENVIRONMENT

2.1 Topography, geology and soils

The site has a north-westerly aspect the hillslope sloping downwards at gradients of 5^{O} - 10^{O} from the upslope position of the farm shed building location at the far eastern section of the land (Figure 1).

The local substrate geology of the subject area at 13 Bungendore Street, Ingleside, occurs within sediments of the Hawkesbury Sandstone. The sandstone-based substrate is largely comprised of medium to coarse-grained quartz sandstone with minor shale and laminite lenses (Herbert 1983).

The soil landscape series of the Hawkesbury Sandstone component of the landscape appears to occur at the boundaries of the colluvial Hawkesbury Soil Landscape Series and the erosional Lambert Soil Landscape Series (Chapman & Murphy 1989).

The Hawkesbury Soil Landscape Series is characterised by rugged, rolling to very steep hills on Hawkesbury Sandstone sediments. The landscape is typified by rock outcropping which may exceed 50%, with narrow crests and ridges, narrow incised valleys with steep sideslopes with rocky benches, broken scarps and boulders (Chapman & Murphy 1989).

The Lambert Soil Landscape Series is characterised by undulating to rolling low hills on Hawkesbury Sandstone sediments. The landscape is typified by rock outcropping often exceeding 50%, broad ridges, gently to moderately inclined sideslopes, wide rock benches with low broken scarps, with small hanging valleys and areas of poor drainage (Chapman & Murphy 1989).

Soils formed on Hawkesbury Soil Landscapes include shallow, discontinuous lithosols and siliceous sands associated with rock outcropping, earthy sands and yellow earths and some yellow podzolics on the inside of benches and along joint and fracture planes, with localised yellow and red podzolics associated with shale lenses (Chapman & Murphy 1989).

Soils formed on Lambert Soil Landscapes include shallow, discontinuous earthy sands and yellow earths on crests and on the inside of benches, shallow siliceous sands and lithosols on leading edges, shallow to moderately deep leached sands, grey earths and gleyed podsols in poorly drained areas and localised yellow earths associated with shale lenses (Chapman & Murphy 1989).

2.2 Existing vegetation

The subject land has been cleared of natural understory and ground cover vegetation over the whole site, providing the whole site with the benefit of meeting the standards of being an Inner Protection Area (IPA).

The general vegetation of the subject land along the slope consists of remnant sparsely located mostly imature to semi-mature canopy trees, including mostly Sydney Red Gum (*Angophora costata*) and Broad-leaved White Mahogany (*Eucalyptus umbra*), retained across a moderately sloping gradient of introduced top-dressed loamy soil containing an exotic grassland (Figures 1 & 2). The exotic grassland is comprised mainly of Winter Grass (*Poa annua*), Perennial Rye Grass (*Lolium perenne*) and Common Couch (*Cynodon dactylon*).

Figures 5 and 6 indicate the general vegetation that characterises the subject land.

Figure 7 is an image of remnant vegetation occurring across a small section of rock outcropping which has not been top-dressed and contains elements of natural vegetation.

Few weed species occur at the site, and only low to occasional frequency of exotic weed species, including Black Nightshade, Wall Fumitory, Umbrella Sedge, Castor Oil Plant and Stagger Weed, were recorded.

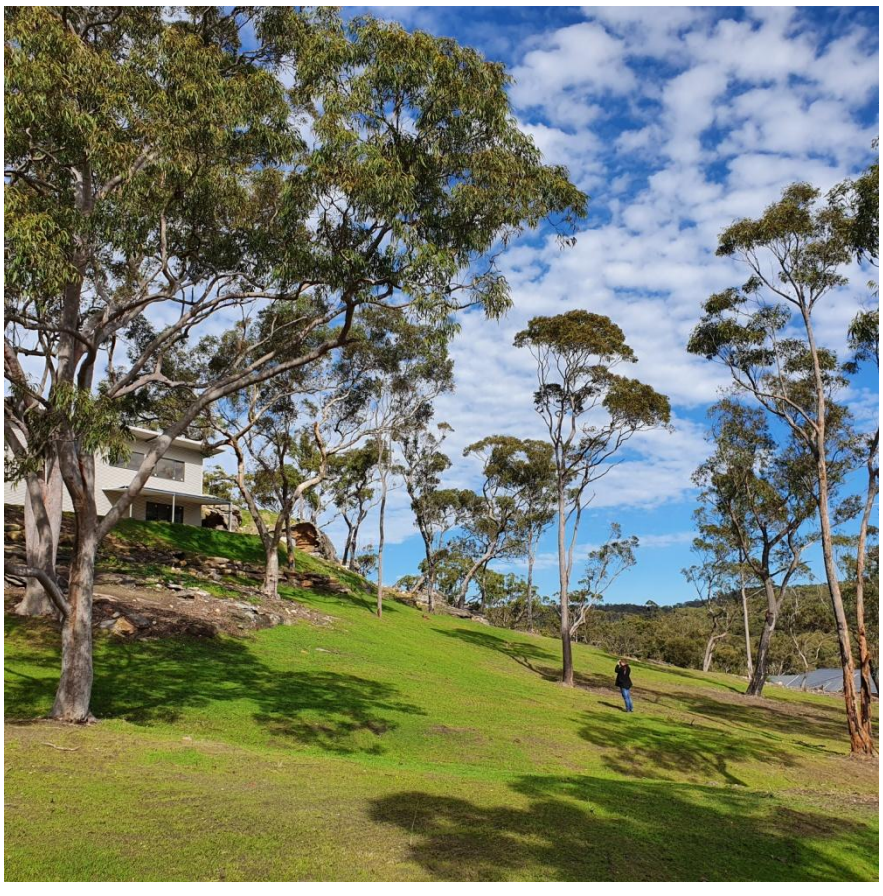

Figure 5 - Image of subject land viewed from about 40m downslope, looking up toward the current farm shed building indicating sparse tree canopy and managed, top-dressed grassy ground cover

Figure 6 - Image of subject land viewed from the current farm shed building indicating sparse tree canopy and managed, top-dressed grassy ground cover occurring down the slope

Figure 7 - Image of rocky section of subject land which has not been top-dressed indicating sparse vegetative cover including Grass Trees and native herbs and grasses with a high extent of leaf litter

2.3 Current and surrounding land use

The aerial view of the subject land at No. 13 Bungendore Street, Ingleside, indicates that much of the crest and ridgetops of the surrounding landscape on low to moderate slopes have been established as residential development, with extensive areas of Garigal and Ku-ring-gai National Parks reserved with natural vegetation (Figure 4; from SIXmaps DPIE 2020).

3 FLORA AND FAUNA SURVEY AND ASSESSMENT

3.1 Methods

3.1.1 Literature review

Existing information on 'Threatened Flora of the Locality', defined as an area of 5km radius around the site, was accessed from the DPIE Bionet Atlas of NSW Wildlife (online BioNet), Commonwealth DAWE Environmental Reporting Tool (August 2020) and RoTAP (Briggs and Leigh 1996) databases. Other literature detailing regionally and locally threatened and significant flora and fauna, as well as plant communities of the study area, included NSW Scientific Committee Final Determinations (1996-2020), Benson and Howell - Natural Vegetation of the Sydney Area (1994), Smith & Smith - Survey of the Duffys Forest Vegetation Community (2000), 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area' OEH (2016) and DPIE Mapping (2020).

3.1.2 Site survey

The subject site was surveyed on 29th July 2020.

3.1.3 Flora survey

Currently existing information on 'Threatened Flora of the Locality', defined as a 10km x 10km area centred around the site, was accessed from the DPIE Atlas of NSW Wildlife (August 2020), the Department of Agriculture, Water and Environment (DAWE) Environmental Reporting Tool (March 2020), and RoTAP (Briggs & Leigh, 1996) databases.

Other literature detailing regionally and locally threatened and significant flora, as well as endangered populations and plant communities of the study area, including NSW Scientific Committee Final Determinations (1996 - 2020) were accessed and reviewed.

Comprehensive surveys were undertaken on foot (Diversity Search method of Cropper 1993, and Threatened Biodiversity Surveys and Assessment - Guidelines for Developments and Activities - DEC 2004) to identify the existence of extant flora populations present on the subject area.

As the understory and ground strata of the subject land was largely cleared, highly structurally and floristically modified and top-dressed wand sown with exotic pasture grass, a quadrat-based (20 x 20m) methodology was undertaken only within a rocky area at the lower section of the slope (Figure 7).

The survey included a complete floristic inventory of indigenous and exotic species and an assessment of the presence, or likelihood of occurrence, of any threatened, rare, regionally or locally significant species or plant community occurring at the surveyed site.

The extent of noxious and other weed incursions on the subject area of the land were assessed.

3.1.4 Fauna Survey

The survey effort complies with the survey effort recommended by the Draft Guidelines for Threatened Species Assessment under Part 3A (DEC and DPI, 2004) for the study area size, habitat types available on the site and seasonal factors.

A dedicated ground search was undertaken as was a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded. Threatened fauna species not recorded in the surveys but with the potential to be present as indicated by habitat are considered in the final assessment.

Strategies employed for the field investigation of the Study Area:

Assessment of the value of habitat suitable for native fauna species and specific habitat structures/resources considered important in life cycles. These structures or resources include:

- Mature trees with hollows for breeding, roosting and/or nesting;
- Particular foraging resources such as certain tree or shrub species;
- Dispersal, migratory or foraging corridors for fauna;
- Leaf litter and ground search for reptiles, frogs and threatened invertebrates;
- Identification of scats and other indirect evidence to suggest fauna utilisation such as tracks, scratch marks or diggings;

3.1.5 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular environmental circumstances related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, grazing pressure, biological life-cycle patterns as in the case of small geophytic taxa such as species of orchids etc.

Diurnal surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame, and assess the suitability of habitat for particular species.

The criteria used to assess the likelihood of threatened species occurring in the Study Area included the specificity of habitat features such as tree canopy cover, relative soil moisture regime, relative soil nutrient regimes, extent of historical disturbance and degradation of vegetation and known occurrences of threatened species in the immediate locality.

If all or most of these collective criteria deemed optimal for the occurrence of a particular threatened species occur in relation to the habitat of the Study Area, then the likelihood of its potential occurrence in the habitat of the Study Area could be assessed as being relatively high. If only some of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then its potential occurrence in the area of study may be deemed moderate at best. If few of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then the likelihood of its occurrence would be assessed as being low to very unlikely.

These criteria are qualified in respect of threatened flora species in Appendix 2 of this report and in relation to threatened species of fauna in Appendix 4 of this report.

3.2 Results - Flora

3.2.1 Landscape features

The subject site occurs within the Pittwater IBRA subregion of the Sydney Basin IBRA Region.

3.2.2 Indigenous and exotic plant species

The subject site contains a ground cover of cleared exotic grassland sown on top-dressed soil overlying natural substrates including extensive rock outcropping, ledges and exposed sandstone rock platforms (Holman *pers comm.*).

Appendix 1 lists the various plant species found to occur within the boundaries of the subject site including the area of sparse tree canopy occurring within the exotic grassland ground cover (Figures 5 & 6) and the small area of rock shelf containing native shrub and ground cover species.

Species nomenclature follows that of Harden (1990 – 2002; 2020 online).

A total of 27 indigenous plant species, and except for the most dominant canopy species, these occurred at very low frequency and at a very low percentage cover over the subject area surveyed. A total of 5 indigenous canopy tree species occur at the subject site including mostly semi-mature individuals of Sydney Red Gum, Broad-leaved White Mahogany and Grey Gum (Figures 1, 2, 5, 6 & 7).

A total of 6 exotic weed species were recorded over the area of the subject land (Appendix 1).

3.2.3 Plant community

Previous mapping

DPIE (2020)

The local ecological plant community that occurs at and surrounding the Study Area has been mapped by DPIE (2020) compiling data from API and environmental attributes of geology, average annual rainfall, topography, elevation, Soil Landscape Series type and extent of disturbance (condition), and including some ground-truthing (Figure 8) (DPIE 2020).

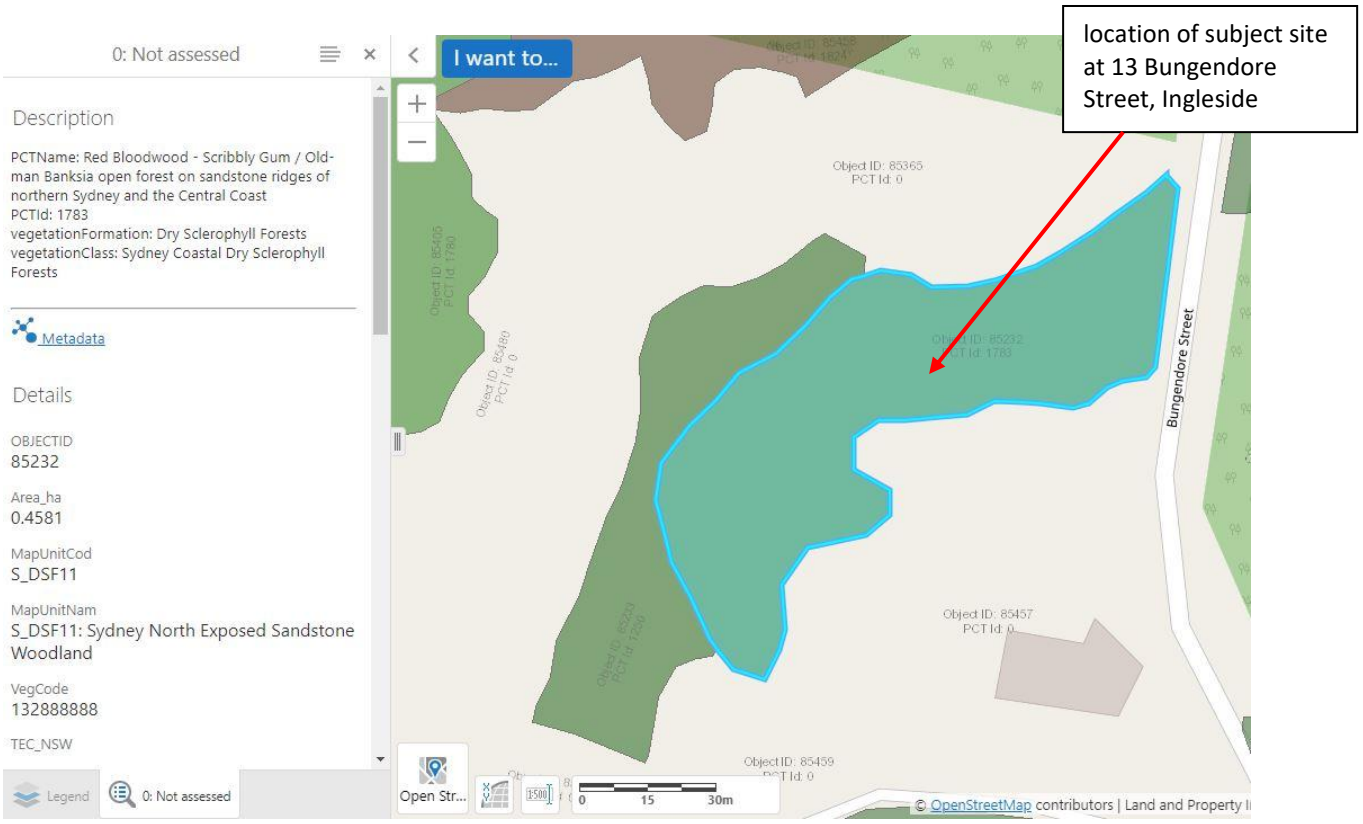

Figure 8 - DPIE (2020) mapping of ecological communities occurring at the subject site (Sydney North Exposed Sandstone Woodland area bounded in green outline) and in the neighbouring locality. (Note the Code: PCT 1783 refers to Sydney North Exposed Sandstone Woodland, whereas the dark green polygon occurring to the west is mapped as Coastal Sandstone Gully Forest; PCT 1250: DPIE 2020)

OEH (2016)

Previous mapping in the locality by OEH (2016) also indicates Sydney North Exposed Sandstone Woodland occurring at the subject site with patches of Duffys Forest occurring along the crest of Mona Vale Road (Figure 9) in association with ironstone layers in the upper soil horizons.

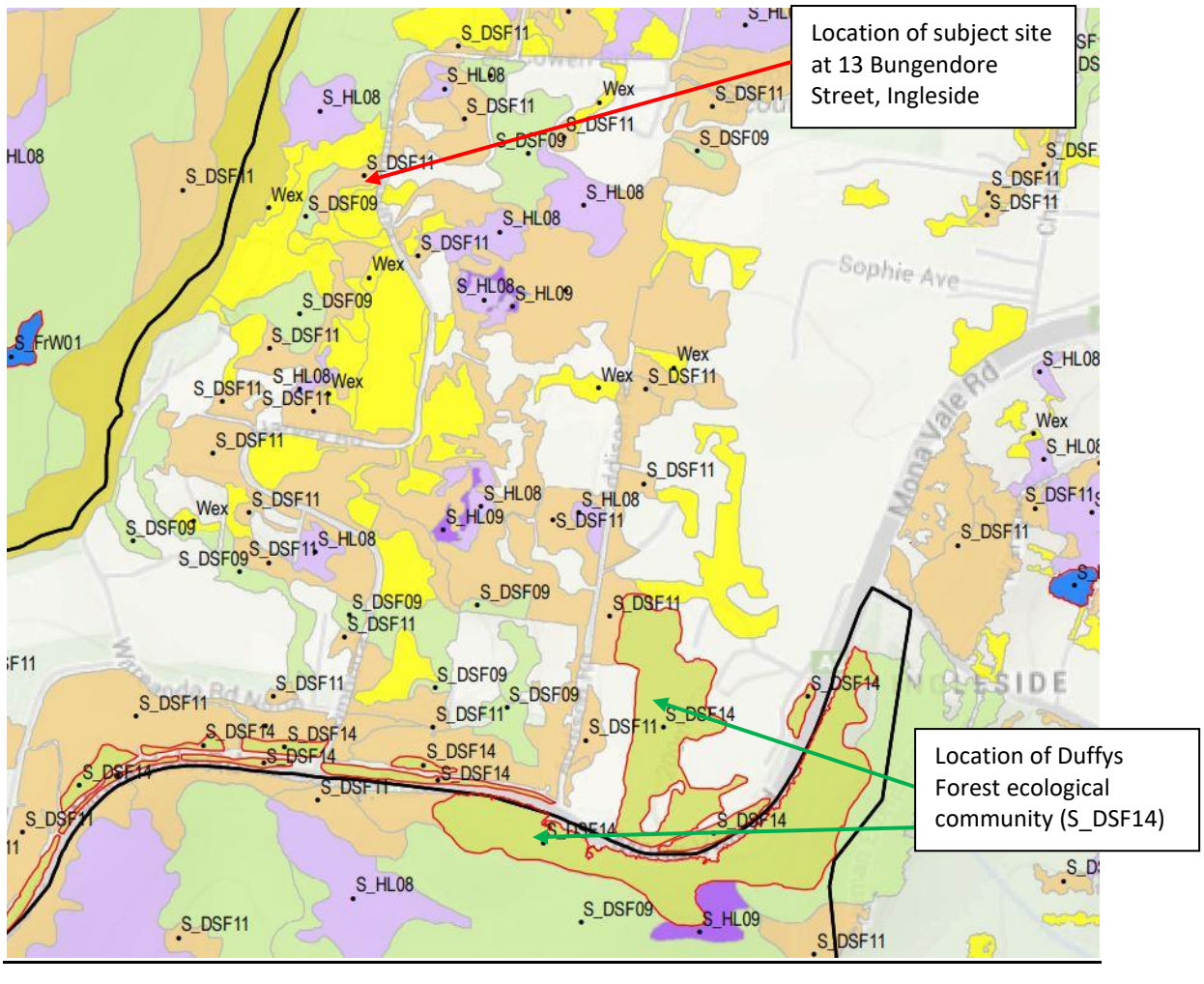

Figure 9 - Mapping by OEH (2016) of Sydney North Exposed Sandstone Woodland at subject site and Duffys Forest ecological community along ridgelines on Mona Vale Road.

Smith & Smith (2000)

Smith & Smith (2000) sampled a total of 32 quadrats to quantitate positively diagnostic and negatively diagnostically representative species and have mapped all locations of Duffys Forest in the Warringah and Pittwater (now Northern Beaches) and Ku-ring-gai LGA's. Based on these quantitative evaluations, mapping for the area containing the subject land indicated that the closest Duffy's Forest ecological community occurred about 1km to the south-east along Mona Vale Road at the Bahai Temple (Figure 10).

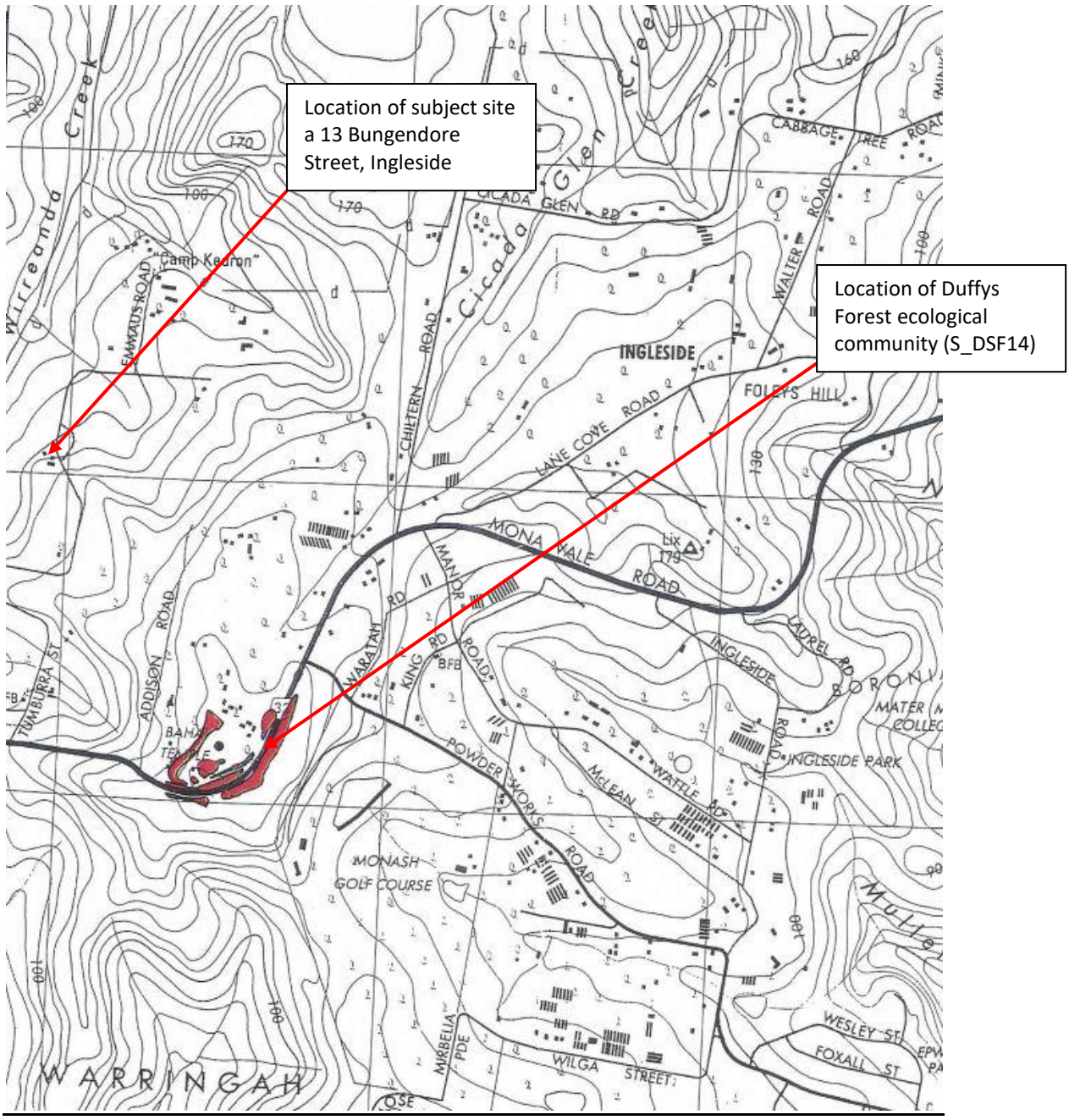

Figure 10 - Smith & Smith (2000) comprehensive mapping of Duffys Forest distributions in the locality of Pittwater and Warringah indicating the nearest distribution of the community occurring near the Bahai Temple along Mona Vale Road

3.2.4 Identification, interpretation and differentiation of Sydney Ironstone Bloodwood - Silvertop Ash Forest and Sydney North Exposed Sandstone Woodland.

Though the mapping by DPIE (2020) indicates that the ecological plant community occurring at the subject site is Sydney North Exposed Sandstone Woodland, there is some conjecture that the community may indicate more resemblance to Sydney Ironstone Bloodwood - Silvertop Ash Forest.

Sydney Ironstone Bloodwood - Silvertop Ash Forest is also known as 'Duffys Forest' named after the suburb where the community was first described by Benson & Howell (1994). According to Smith & Smith (2000), the final determination of this community as an Endangered Ecological Community is not a good indicator of the community, particularly in regard to the listed characteristic species, the vegetation structure and its habitat distribution.

Gunninah Environmental Consultants (1999) discusses the difficulty of identifying the Duffys Forest vegetation community from the description in the final determination. There appears to be a poor correlation between the soil mapping by Chapman & Murphy (1989) and the mapping of Duffys Forest distributions in Benson & Howell (1994). Various maps and descriptions of the community have generated confusion with respect to the differentiation of Duffys Forest with other sandstone-based vegetation communities in the Sydney locality, and in 1999 there appear to be no floristic criteria to differentiate the community from apparently identical or extremely similar sandstone vegetation occurring in nearby sites (Smith & Smith 2000).

As such, Smith & Smith (2000) have derived a formula based on the sampling of a 20 x 20m quadrat and comparing diagnostically positively occurring species with negatively diagnostic species, in relation to the overall numbers of native species occurring in the quadrat.

An index was derived for the presence of Duffys Forest compared to the index for a sandstone-based ridgetop community or gully forest community.

$$\text{The Duffys Forest Index (DFI)} = \frac{100\,(x + (20-y))}{40}$$

where x = number of +ve diagnostic species for Duffys Forest in a 20 x 20m quadrat;
y = number of -ve diagnostic species for Duffys Forest in a 20 x 20m quadrat.

It can be seen that the value of the index ranges from 100 when all positive species are present and all negative diagnostic species are absent, to 0 when the reverse occurs. If there are no positive or negative diagnostic species for Duffys Forest within the quadrat, then the value for the Index is neutral at 50 (Smith & Smith 2000). Smith & Smith (2000) have derived this index compiled from a total of 32 separate sites identified as locations of Duffys Forest.

At the subject land there was only one area that contained any natural ground cover, located on a rocky area lower down the slope that contained 19 native species (Appendix 1) (Figure 7).

The mapping and profile descriptions in OEH (2016) are also instructive in listing positively diagnostic species for Duffys Forest, Sydney North Exposed Sandstone Woodland and Coastal Sandstone Gully Forest (OEH 2016).

Sydney Ironstone Bloodwood - Silvertop Ash Forest (Duffy's Forest)

According to Smith & Smith (2000) Duffys forest typically occurs in association with shale lenses and lateritic (ironstone) soils in Hawkesbury Sandstone. The community usually occurs on ridgetops, plateaus and upper slopes, but may also occur on mid-slopes or benches downslope of Sydney Sandstone Ridgetop sites. According to OEH (2016) the community is closely associated with rust-coloured ironstone mantles layered above sandstone ridgelines and occurs as a low to moderately tall eucalypt cover on flat or gently sloping terrain. The thickness of the ironstone mantle varies considerably across the landscape and in some cases may be completely eroded. Sites typically have no outcropping sandstone (OEH 2016).

The principal canopy species appear to include Silvertop Ash (*Eucalyptus sieberi*), Brown Stringybark (*Eucalyptus capitellata*), Red Bloodwood (*Corymbia gummifera*), Broad-leaved Scribbly Gum (*Eucalyptus haemastoma*), Narrow-leaved Stringybark (*Eucalyptus oblonga*) and Sydney Red Gum (*Angophora costata*) (Smith & Smith 2000; OEH 2016). According to OEH (2016) Broad-leaved Scribbly Gum and Sydney Red Gum are not uncommon in the assemblage although they rarely dominate. A diverse species mix of Proteaceae are particularly dominant in the shrub layer (OEH 2016).

Sydney North Exposed Sandstone Woodland

This exposed woodland occurs widespread across the Hawkesbury sandstone plateau of northern Sydney and the Central Coast hinterland (OEH 2016). The canopy is typically low in height and the structure varies from woodland to open forest. The community occurs on free draining soils in exposed locations such as crests, ridges and exposed gully slopes (OEH 2016) such as occur at the subject site (Figures 5 & 6). Soil development is generally poor.

The principal canopy species appear to include Red Bloodwood (*Corymbia gummifera*), Broad-leaved Scribbly Gum (*Eucalyptus haemastoma*), Sydney Red Gum (*Angophora costata*) and Broad-leaved White Mahogany (*Eucalyptus umbra*) (Smith & Smith 2000; OEH 2016). A diverse species mix of sclerophyllous shrub species such as banksias, tea-tree, wattle, geebungs and peas are common in the shrub layer (OEH 2016).

Assessment of Duffys Forest Index (DFI), Sandstone Ridgetop (Sydney North Exposed Sandstone Woodland) Index and Coastal Sandstone Gully Forest Index.

From the species recorded in the quadrat within the rocky area at the base of the slope, a total of 19 native species were recorded (Appendix 1). From Smith & Smith (2000) the positively diagnostic and negatively diagnostic species for all three potential ecological community types could be evaluated (although the sample size is small, and only one quadrat could be recorded and this occurring on rocky sandstone substrates, Figure 7).

The results for the different indices for the sampled quadrat are as follows:

1. DFI (Duffys Forest Index) = $\frac{100\ (0 + (20 - 4))}{40}$ = 40 (so NOT LIKELY Duffys Forest)

2. Sydney North Exposed Sandstone Woodland Index = $\frac{100\ (2 + (20-0))}{40}$ = 55

   (more likely Sydney North Exposed Sandstone Woodland)

3. Coastal Sandstone Gully forest Index = $\frac{100\ (1 + (20-0))}{40}$ = 52.5

Table 1 compares the attributes of the current subject area with those of the identifiable known attributes of Ironbark Silvertop Ash-Red Bloodwood Forest (Duffys Forest) sites.

ATTRIBUTE AT SUBJECT SITE 1. LANDSCAPE AND POSITION ON SLOPE	SYDNEY NORTH EXPOSED SANDSTONE WOODLAND	SYDNEY IRONSTONE BLOODWOOD - SILVERTOP ASH FOREST	COMMENT
Fairly steep rocky Sideslope	Occurs on crests, ridges and exposed gully slopes (DPIE 2020)	Occurs in association with rust- coloured ironstone mantles layered above sandstone ridgelines (DPIE 2020) (Benson & Howell 1994)	No ironstone mantles at subject site on sideslopes with high rock exposure
High incidence of rock outcropping (Figure 7), much of which has been covered by topsoil dressing and sown pasture grass (Holman *pers comm*).	Occurs on free-draining sands in exposed locations such as gully slopes and crests. Soil landscapes include Hawkesbury and Lambert, both of which include high rock outcropping (Chapman & Murphy 1989)	Sites typically have NO outcropping sandstone (OEH 2016)	Substantial rock outcroppping at subject site (Figures 5, 6 & 7)

ATTRIBUTE AT SUBJECT SITE 2. FLORISTICS	SYDNEY NORTH EXPOSED SANDSTONE WOODLAND	SYDNEY IRONSTONE BLOODWOOD - SILVERTOP ASH FOREST	COMMENT
Duffys Forest Index and Indices for ridgetop woodlands and gully forests calculated using positive and negative diagnostic species from sampled 20 x 20m quadrat (Smith & Smith 2000) (sampled from one quadrat on rocky terrain - Appendix 1).	Sydney Sandstone Ridgetop Woodland Index = 55 (Smith & Smith 2000)	Duffys Forest Index = 40 (Smith & Smith 2000) Negatively diagnostic species recorded in the quadrat include: *Eucalyptus punctata; Shcoenus imberbis; Woollsia pungens;* and *Eriostemon australasius* (Smith & Smith 2000)	Value greater than 50 indicates the more likely community; as such more representative of Sydney North Exposed Sandstone Woodland
Positively diagnostic species for each community in 20 x 20m quadrat (derived from lists provided by OEH (2016).	13 +ve diagnostic spp in 20 x 20m quadrat; 17 if include all native spp on subject land.	7 +ve diagnostic spp in 20 x 20m quadrat; 10 if include all native spp on subject land	Greater number of diagnostically positive species occur in 20 x 20m quadrat for Sydney North Exposed Sandstone Woodland
Presence of Broad-leaved White Mahogany (*Eucalyptus umbra*) and Sydney Red Gum (*Angophora costata*) on site	'Other eucalypts include Sydney Red Gum and Broad-leaved White Mahogany' (OEH 2016); Broad-leaved White Mahogany is positively diagnostic (OEH 2016)	Although Sydney Red Gum is not uncommon, the species rarely dominates (OEH 2016) Broad-leaved White Mahogany is not diagnostic. (Note that Benson & Howell [1994] document a very restricted distribution occurring on shale substrates in the south of Brisbane Waters National Park which includes Sydney Red Gum, Broad-leaved White Mahogany and Grey Gum in the canopy assemblage)	Sydney Red Gum dominates at the site (47% of a total of 30 trees recorded at site). Broad-leaved White Mahogany represents 33% of canopy species at the subject site
Presence of Grey Gum (*Eucalyptus punctata*) at subject site	Grey Gum has a fidelity frequency of 0.54 in these sites (n = 13) (Smith & Smith 2000)	Grey Gum is negatively diagnostic and has a fidelity frequency of 0.1 in these sites (n = 32)	Grey Gum is negatively diagnostic for Duffys Forest and occurs at the subject site (5 x more likely to occur in

		(Smith & Smith 2000)	sandstone sites other than Duffys Forest) (Smith & Smith 2000)
Presence of species of Proteaceae	Species of Proteaceae as well as many other families of shrub species occur in assemblages of Sydney North Exposed Sandstone Woodland (OEH 2016)	In Duffys Forest a high number of species of Proteaceae are characteristic (OEH 2016), Benson & Howell (1990)	Only 1 species of Proteaceae, Pine-leaved Geebung (*Persoonia pinifolius*), was observed at the site
ATTRIBUTE AT SUBJECT SITE **3. MAPPING**	**SYDNEY NORTH EXPOSED SANDSTONE WOODLAND**	**SYDNEY IRONSTONE BLOODWOOD - SILVERTOP ASH FOREST**	**COMMENT**
Mapping by various authors and entities	DPIE (2020) and OEH (2016) have mapped the area at the subject site as Sydney North Exposed Sandstone Woodland	DPIE (2020) and OEH (2016) have mapped the nearest area of this community at the Mona Vale end of Tumburra Street on the crest of the ridge about 1km south of the subject site	DPIE (2020) and OEH (2016) have mapped the area at the subject site and have mapped the vegetation at the site as Sydney North Exposed Sandstone Woodland
		Smith & Smith (2000) have mapped Duffys Forest about 1km to the south-east near the Bahai Temple	Smith & Smith (2000) have not mapped the subject site as Duffys Forest

Table 1 - Compares the attributes of the current subject area with those of the identifiable known attributes of Ironbark Silvertop Ash-Red Bloodwood Forest and Sydney North Exposed Sandstone Woodland sites (OEH 2016; DPIE 2020).

CONCLUSIONS

From Table 1, in regard to physical landscape features including:

- Hillside position on sideslope rather than on crest or ridge topography (OEH 2016; Smith & Smith 2000),
- Extent of rock outcropping (OEH 2016; Smith & Smith 2000),
- Absence of any ironstone mantle sediments in the upper soil layers (OEH 2016; Smith & Smith 2000), and

Floristic attributes including:

- Dominance of Sydney Red Gum and Broad-leaved White Mahogany in canopy assemblage (OEH 2016; Smith & Smith 2000),
- Low Index value for Duffy's Forest Index at the subject site (Smith & Smith 2000),
- Presence of negative diagnostic species for Duffys Forest in recorded assemblage including *Eucalyptus punctata; Schoenus imberbis; Woollsia pungens* and *Eriostemon australasius* (Smith & Smith 2000), and

Previous and current mapping in relation to subject site including from:

- DPIE (2020);
- OEH (2016); and
- Smith & Smith (2000),

These physical and floristic attributes pertaining to the location and floristic assemblage occurring at the subject site, as well as the documented vegetation mapping prepared by DPIE (2020), OEH (2016) and Smith & Smith (2000), indicate that the subject site, though structurally and floristically compromised by clearing in respect of the 10/50 Rule (NSW RFS 2015) to afford bushfire protection to the current buildings that occur at the subject land, is more likely to contain an assemblage of Sydney North Exposed Sandstone Woodland with some elements of Coastal Sandstone Gully Forest rather than Sydney Ironstone Red Bloodwood - Silvertop Ash Forest (Duffys Forest).

3.2.5 Conservation status of Sydney North Exposed Sandstone Woodland ecological community

The Sydney North Exposed Sandstone Woodland ecological community is well represented in a number of conservation reserves of northern Sydney such as Ku-ring-gai Chase and Garigal National Parks, as well as in the Central Coast hinterland (OEH 2016).

The community as described by OEH (2016) and DPIE (2020) is not listed on registers of the BC Act (2016) or the Commonwealth EPBC Act (1999).

3.2.6 Impacts to vegetation resulting from proposed development and mitigation measures

Trees proposed for removal

No trees are proposed for removal and none occur within 10m of the subject Farm Shed Building that is proposed to be converted to a Farm Stay Accommodation Building.

Other vegetation proposed for removal

No shrubs are proposed for removal and none occur within 50m of the subject Farm Shed Building that is proposed to be converted to a Farm Stay Accommodation Building. The area has been cleared of shrub cover in compliance with the 10/50 Rule (NSW RFS 2015, NSW Government 2018) and the hillslope area top-dressed with a loamy topsoil to a minimum 100mm depth which also covers much exposed rock platform and outcrops which occur along the slope (Figure 7).

The introduced topsoil has been sown with a mixture of exotic pasture grass species including mostly Winter Grass and Perennial Ryegrass but also including Common Couch (Figures 5 & 6).

Rock structures proposed for removal

No rock outcrops or exposed rock formations will be impacted by the proposed development.

Maintenance of reduced vegetative cover to afford bushfire protection

As the natural ground surface has been cleared of vegetation and has been top-dressed with a substantial depth of introduced soil and grass cover, it is considered highly unlikely that any natural vegetation will regrow from seed or underground vegetative stems or rootstock as stated in relation to Recovering bushland on the Cumberland Plain (DEC 2005). It is accepted that if a site has been cleared and continually cultivated with exotic grassland, it will have little if any resilience (DEC 2005) (Figures 5 & 6).

To maintain a 10/50 bushfire protection zone (NSW RFS 2015, NSW Government 2018), it is recommended that a bushfire management plan be prepared to ensure bushfire protection is afforded to the property in perpetuity.

Mitigation measures to enhance fauna habitat

Few trees within the IPA area (Figure 2) were observed to contain any hollows or spouts suitable for sheltering or breeding for small avifauna or microbats. A large mature individual of Sydney Red Gum was observed to containing a moderately sized hollow, an image which is depicted in the report by Land Eco Consulting (unknown date). This hollow with individual of Sulphur Crested Cockatoo in attendance is reproduced as Figure 11.

As such, it is suggested that 2 nest boxes suitable for medium sized birds and two bat boxes may be installed about 10m on trunks of existing trees in suitable locations to provide such habitat for these fauna.

Figure 11 - Individual of Sulphur-crested Cockatoo inspecting a moderately sized hollow in the trunk of a mature individual of Sydney Red Gum that occurs within the IPA of the APZ of the subject property (from Land Eco Consulting undated)

3.2.7 Flora species of conservation significance

Threatened species

The DPIE Bionet Atlas of NSW Wildlife (2020) records for an area of 5km radius around the subject site indicate that 15 species of conservation significance have been recorded within a radius of 5km of the site within the last 20 years (Table 2).

Seven of these species are listed as Endangered on the BC Act with 8 listed as Vulnerable, with 4 species listed as Endangered and 5 Vulnerable on the Commonwealth EPBC Act.

Appendix 2 lists these species with an account of their threatened status, geographical range, physiognomic attributes, habitat features and likelihood of occurrence.

Table 2 - 15 species of threatened flora that have been recorded within a 10km area centred around the subject site within the last 20 years (DPIE 2020)

Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Elaeocarpaceae		*Tetratheca glandulosa*	V		74
Ericaceae		*Epacris purpurascens var. purpurascens*	V		1
Grammitidaceae	Narrow-leaf Finger Fern	*Grammitis stenophylla*	E1,3		1
Lamiaceae	Villous Mint-bush	*Prostanthera densa*	V	V	1
Malvaceae		*Lasiopetalum joyceae*	V	V	2
Myrtaceae	Netted Bottle Brush	*Callistemon linearifolius*	V,3		2
	Camfield's Stringybark	*Eucalyptus camfieldii*	V	V	14
		Kunzea rupestris	V	V	1
	Scrub Turpentine	*Rhodamnia rubescens*	E4A		15
	Magenta Lilly Pilly	*Syzygium paniculatum*	E1	V	8
Orchidaceae	Bauer's Midge Orchid	*Genoplesium baueri*	E1	E	1
	Angus's Onion Orchid	*Microtis angusii*	E1	E	89
Proteaceae	Caley's Grevillea	*Grevillea caleyi*	E4A	CE	604
	Hairy Geebung	*Persoonia hirsuta*	E1	E	3
Thymelaeaceae		*Pimelea curviflora var. curviflora*	V	V	7

For all of these species, the cleared and highly modified structural and floristic habitat of the subject site is unsuitable for their occurrence (Appendix 2) (Figures 5, 6 & 7).

Figure 12 indicates the recorded sightings of five of the most recorded flora species of conservation significance.

Two threatened species have been recorded within 1km of the subject site. These include Caley's Grevillea and *Tetratheca glandulosa* (Figure 12).

Caley's Grevillea occurs on the ridgetop sites between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by *Eucalyptus sieberi* and *E. gummifera*, commonly found in the endangered Duffys Forest ecological community (DPIE 2020). The ecological community that occurs at the subject site is highly likely to be described as Sydney North Exposed Sandstone Woodland and contains no laterite or ironstone layers in the sediment profile and as such is not likely to support Caley's Grevillea. None was observed at the subject site or in the near vicinity (Figures 5, 6 & 7).

Tetratheca glandulosa is usually associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow,

consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops.

The vegetation structure of the habitat of *Tetratheca glandulosa* varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Sydney Sandstone Ridgetop Woodland communities containing typical common woodland tree species such as *Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa*, and/or *E. sparsifolia*, with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae (DPIE 2020). Most of these canopy species do not occur at the subject site (Appendix 1). The subject site has been highly structurally and floristically modified to comply with the 10/50 Rule (NSW RFS 2015, NSW Government 2018), and as such, no individuals of this species were observed at the site, including at the rock shelf area indicated in Figure 7.

DEC (2005) note that if a site has been cleared and continually cultivated with exotic grassland, it will have little if any resilience and former native species will likely not regrow through the cultivated sown pasture grass cover (Figures 5 & 6).

As such, none of the threatened flora species occurs or was expected to occur at or in the vicinity of the subject site (Figure 12).

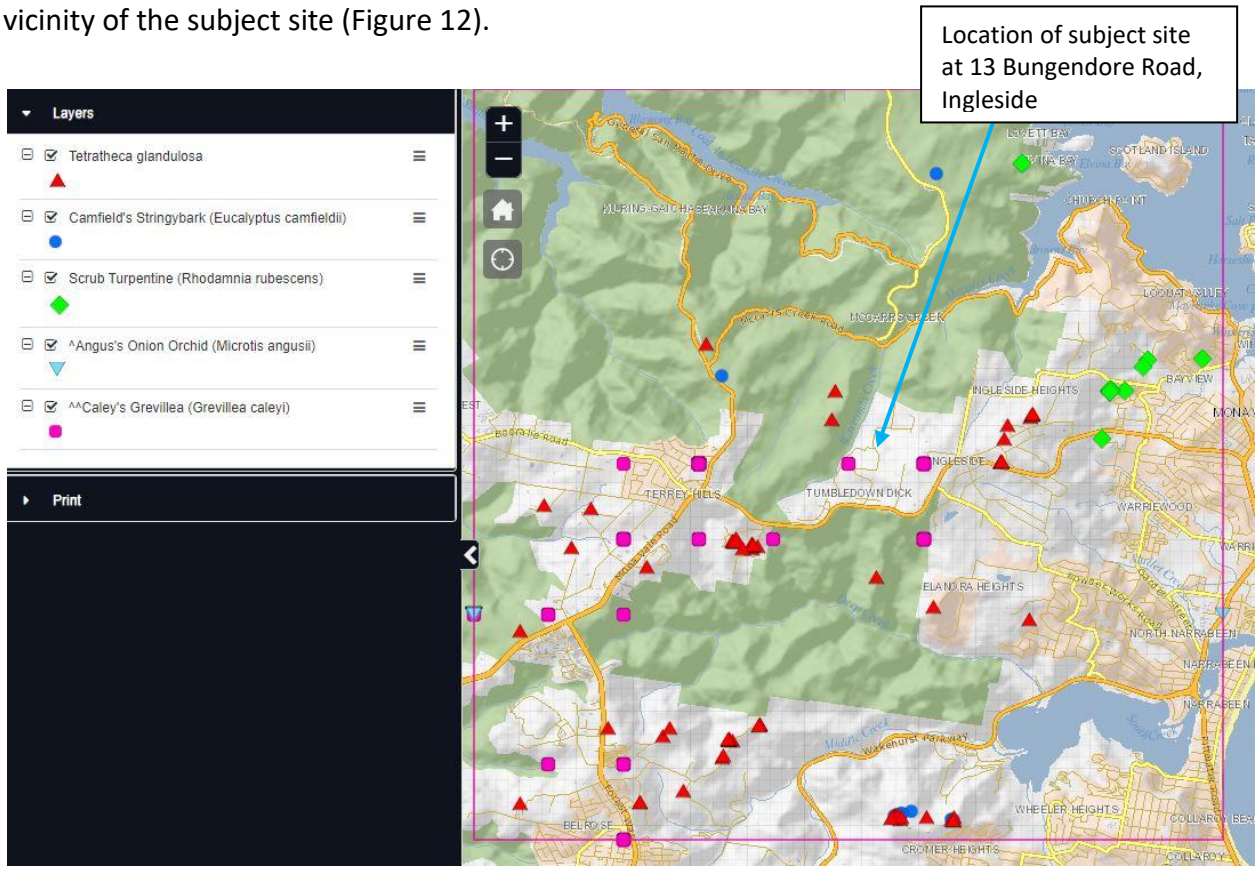

Figure 12 - Recorded sightings of 5 of the most recorded threatened flora species within a 5km radius of the subject site at 13 Bungendore Road, Ingleside (DPIE 2020)

3.3 Results - Fauna and habitat potential assessment

The following fauna assessment has been prepared with particular regard to the BC Act, Section 5A of the current EP&A Act and the EPBC Act.

3.3.1 Location and weather conditions of subject surveyed site

Grid co-ordinates of centre of subject land;
latitude: -33.6769756^{o};
longitude: 151.2521111^{o}

Weather conditions
Cool and sunny weather conditions with light winds, no rain

Temps: 9am - 13.2^{o} Wind: WSW 7km/hr
3pm - 15.9^{o} SE 9km/hr

A dedicated ground search was undertaken as well as a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded.

3.3.2 Habitats present

The habitats of the subject land include:

1. a cleared, managed exotic pasture grassland extending for at least 50m down the slope to cleared levelled areas on the lower section of the land (Figure 1), and
2. sparse tree canopies of mostly semi-mature trees in an open woodland structure with overall canopy cover <10% (Figures 5, 6 & 7).

The exotic pasture grassland provides poor habitat but may provide some food resources for seed foraging avifauna.

Canopy trees may provide sheltering and seasonal food resources for avifauna, arboreal species and the Grey-headed Flying Fox. Most individuals of trees occurring within the subject area were semi-mature or immature with few exceptions (Figures 5 & 6). Few trees contained any hollows or spouts suitable for nesting by small birds or microbat species. One isolated mature individual of Sydney Red Gum contained a moderately sized hollow as shown in Figure 11. No arboreal nests were recorded during this survey.

There are developed areas including built structures and limited rock walls, as well as rocky outcrops and rock shelves that may provide some safe foraging and potential shelter for small terrestrial fauna species such as skinks and some small feral mammalian species such as mice and the Black Rat.

An overhang cave rock outcrop occurs adjacent to the current farm shed building (Figure 13).

Figure 13- Sandstone outcrop overhang/open cave structure occurring at the upper slope of the subject land near to the current farm shed building

This overhang/open cave structure is considered too exposed to provide effective sheltering/roosting habitat for cave dwelling microchiropterans. There may be the possible occasional or intermittent use of one of the small holes in the cave roof but it would be highly unlikely to constitute any significant long-term use (Rowles microchiropteran specialist *pers comm.*).

3.3.3 Wildlife corridor potential

The subject area occurs as a highly structurally and floristically modified landscape within a network of reserves and national parks with other development scattered throughout the locality (Figures 1, 4, 5, 6 & 7) . The presence of canopy trees affords a high degree of connectivity for avian and arboreal species in the locality.

3.3.4 Fauna recorded

Table 3 - Indicates the fauna recorded or expected to occur within the area of survey at Ingleside.

Class/Family	Common name	Scientific name	Open woodland vegetation in exotic pasture grassland and built forms onsite
REPTILIA Scincidae	Dark-flecked Garden Sunskink	*Lampropholis delicata*	e
	Eastern Water Skink	*Eulamprus quoyii*	e
AVES Alcedinidae	Laughing Kookaburra	*Dacelo novaeguineae*	x
Anatidae	Maned Duck (Australian Wood Duck)	*Chenochetta jubata*	x
Cacatuidae	Galah	*Eolophus roseicapillus*	e
	Sulphur-crested Cockatoo	*Cacatua galerita*	x
Psittacidae	Crimson Rosella	*Platycercus elegans*	e
	Rainbow Lorikeet	*Trichoglossus haematodus*	e
Meliphagidae	Noisy Miner	*Manorina flavigula*	x
Corvidae	Australian Raven	*Corvus coronoides*	e
Hirundinidae	Welcome Swallow	*Hirundo neoxena*	x
MAMMALIA Macropodidae	Swamp Wallaby	*Wallabia bicolor*	x (scat)
Pseudocheiridae	Common Ringtail possum	*Pseudocheirus peregrinus*	e
Phalangeridae	Common Brushtail Possum	*Trichosurus vulpecula*	e
Pteropodidae	Grey-headed Flying-fox	*Pteropus poliocephalus*	e
Vespertilionidae	Gould's Wattled Bat	*Chalinolobus gouldii*	e
Muridae	Black Rat*	*Rattus rattus*	e

Legend:

x - observed either onsite or overhead or heard in vicinity;
e - expected to occur onsite and in vicinity

The weather conditions at the time of survey included cool, sunny temperatures, light winds, fair conditions for bird activity.

Of the bird species observed or expected to occur, most were species that prefer a woodland habitat (Table 3). There was no dominant species among the birds with each occupying selective niches.

The Common Brushtail Possum (*Trichosurus vulpecula*) is expected to occur within the open woodland habitat.

No trees within the surveyed area contained any small hollows or spouts that could accommodate small mammals or birds.

The common microchiropterans Little Forest Bat (*Vespadelus vulturnus*), and Gould's Wattled Bat (*Chalinolobus gouldii*) may be expected to occur occasionally for foraging. The Little Forest Bat roosts in hollows in old trees, buildings and timber stacks. These bat species are common insectivorous microbat species in the region.

Reptilian habitat was rated as relatively poor within the exotic grassland cover. Rock shelves and leaf litter was rated good for sheltering (Figure 7). The Dark-flecked skink (*Lampropholis delicata*) is expected to occur at this location.

Habitat for common amphibian species was rated as fair as a pond occurs at the subject site (top centre of image in Figure 1)

The pest species Black Rat and House Mouse may be expected to occur occasionally at and in the vicinity of the subject site in association with built structures (Table 3).

3.3.5 Fauna species of conservation significance

3.3.5.1 Threatened species

The criteria used to assess the likelihood of threatened species occurring in the Study Area include the specificity of habitat features such as tree canopy cover, relative soil moisture regime, relative soil nutrient regimes, historical disturbance and degradation of vegetation and known occurrences of threatened species in the immediate locality.

If all or most of these collective criteria deemed optimal for the occurrence of a particular threatened species occur in relation to the habitat of the Study Area, then the likelihood of its potential occurrence in the habitat of the Study Area could be assessed as being relatively high. If only some of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then its potential occurrence in the area of study may be deemed moderate at best. If few of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then the likelihood of its occurrence would be assessed as being low to very unlikely.

The DPIE Atlas of NSW Wildlife database 2020 (Dept Planning, Industry and Environment) listed thirty eight (38) species of terrestrial and avifauna considered threatened under the BC Act within a 5 km radius of the site (Table 4). Five of these species are designated as endangered by the NSW Scientific Committee with the remainder designated as vulnerable. Under the EPBC Act 1999, five species are listed as endangered and five are listed as vulnerable.

Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Amphibia Myobatrachidae	Giant Burrowing Frog	*Heleioporus australiacus*	V	V	40
	Red-crowned Toadlet	*Pseudophryne australis*	V		86
Reptilia Varanidae	Rosenberg's Goanna	*Varanus rosenbergi*	V		93
Aves Columbidae	Superb Fruit-Dove	*Ptilinopus superbus*	V		2
Apodidae	White-throated Needletail	*Hirundapus caudacutus*		V,C,J,K	9
Ardeidae	Australasian Bittern	*Botaurus poiciloptilus*	E1	E	2
	Black Bittern	*Ixobrychus flavicollis*	V		17
Accipitridae	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V		22
	Little Eagle	*Hieraaetus morphnoides*	V		5
	Square-tailed Kite	*Lophoictinia isura*	V		4
Burhinidae	Bush Stone-curlew	*Burhinus grallarius*	E1		1
Cacatuidae	Gang-gang Cockatoo	*Callocephalon fimbriatum*	V		2
	Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V		96
Psittacidae	Little Lorikeet	*Glossopsitta pusilla*	V		12
	Swift Parrot	*Lathamus discolor*	E1	CE	17
Strigidae	Barking Owl	*Ninox connivens*	V		30
	Powerful Owl	*Ninox strenua*	V		166
Tytonidae	Masked Owl	*Tyto novaehollandiae*	V		4
	Sooty Owl	*Tyto tenebricosa*	V		2
Meliphagidae	Regent Honeyeater	*Anthochaera phrygia*	E4A,	CE	33
	Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V		1
Neosittidae	Varied Sittella	*Daphoenositta chrysoptera*	V		3
Petroicidae	Scarlet Robin	*Petroica boodang*	V		1
Mammalia Dasyuridae	Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	8
Peramelidae	Southern Brown Bandicoot (eastern)	*Isoodon obesulus obesulus*	E1	E	39
Phascolarctidae	Koala	*Phascolarctos cinereus*	V	V	12
Burramyidae	Eastern Pygmy-possum	*Cercartetus nanus*	V		407
Petauridae	Squirrel Glider	*Petaurus norfolcensis*	V		3
Pteropodidae	Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	100
Emballonuridae	Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		2
Molossidae	Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V		19
Vespertilionidae	Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	15

Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Vespertilionidae	Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		1
	Southern Myotis	*Myotis macropus*	V		50
	Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		5
Muridae	New Holland Mouse	*Pseudomys novaehollandiae*		V	1
Miniopteridae	Little Bent-winged Bat	*Miniopterus australis*	V		52
	Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V		112

Legend to Table 4 - BC Act, EPBC Act, Migratory Bird Agreements

Key	
Environmental Protection and Biodiversity Conservation Act (EPBC Act) 1999	Biodiversity Conservation Act (BC Act) 2016
CE - Critically Endangered E - Endangered V - Vulnerable	E1 - Endangered E4 - critically endangered V - Vulnerable C CAMBA Migratory bird agreement between Australia and China

Table 4 - 38 species of threatened fauna recorded within 5km radius of the subject site within the previous 20 years (DPIE Bionet Atlas 2020).

3.3.5.2 Threatened species with potential to occur at the subject land

All threatened species listed require specific habitat for foraging, nesting or roosting. The subject land was assessed for these habitat requirements (refer to Appendix 3).

Due to the highly modified structural and floristic habitat of the IPA within the subject site (Figures 5 & 6), no threatened fauna species are considered likely to regularly occur as indicated by the recorded sightings of threatened fauna species in the locality. Figures 14 & 15 indicate the located sightings of the most recorded threatened fauna species within a 10km area surrounding the subject site within the last 20 years (DPIE 2020).

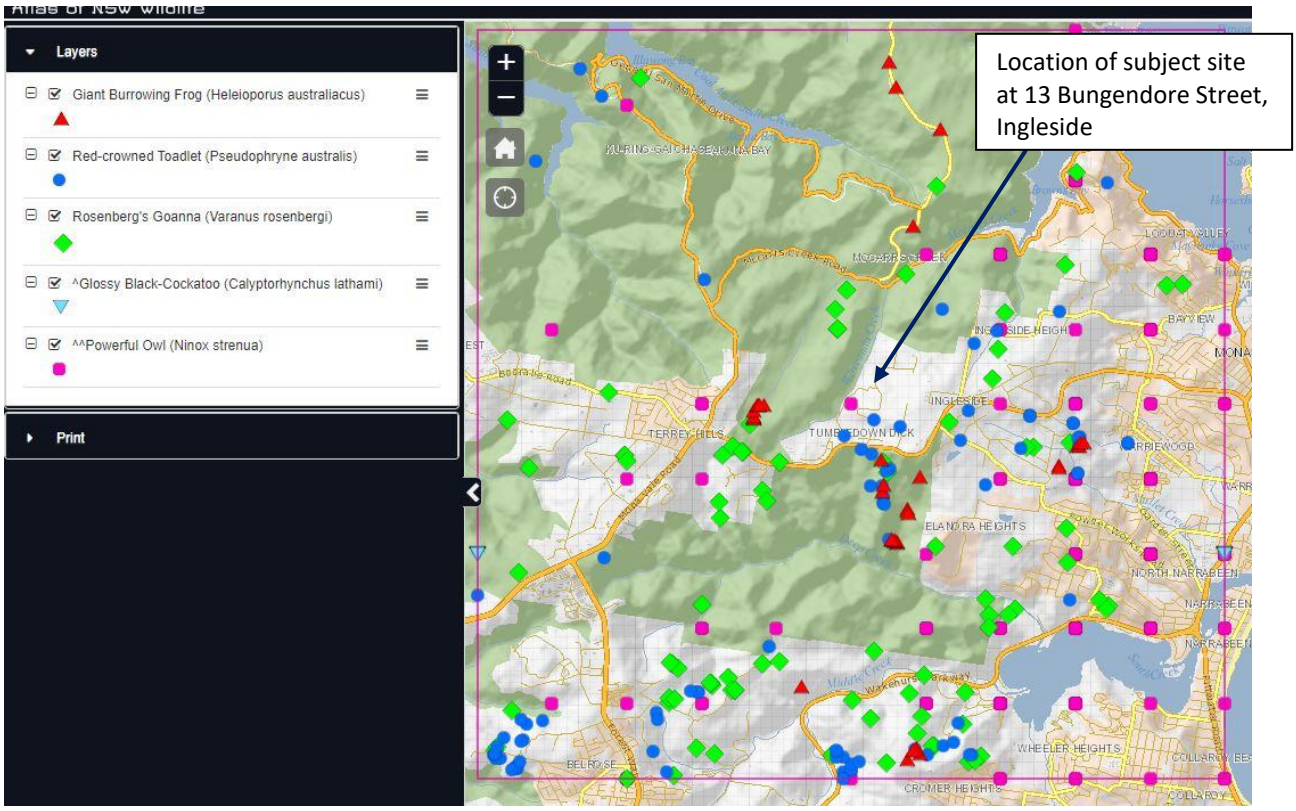

Figure 14 - Indicates recorded sightings of 5 threatened fauna species in the locality of the subject site, including The Powerful Owl and Red-crowned Toadlet.

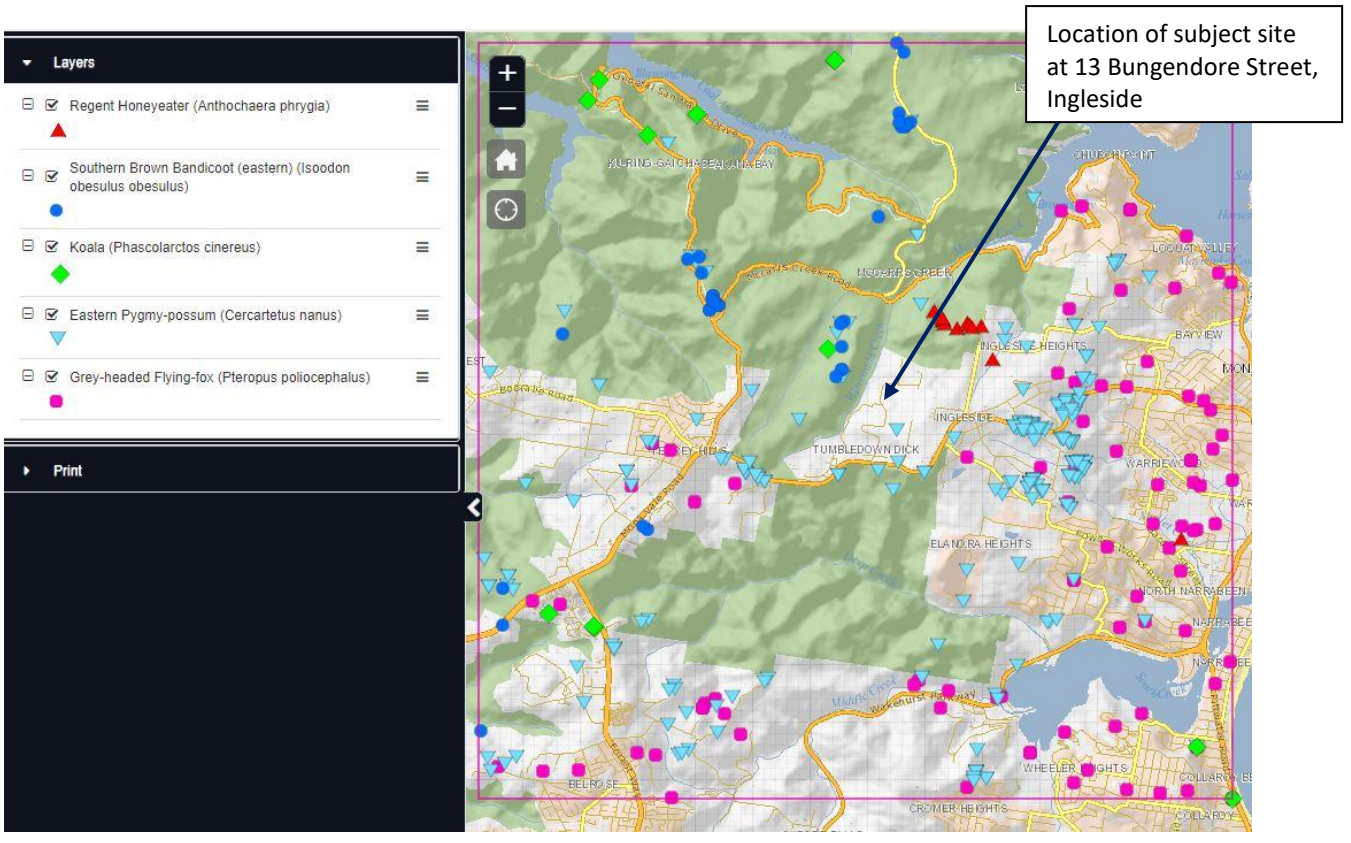

Figure 15 - Indicates recorded sightings of 5 threatened fauna species in the locality of the subject site, including the Eastern Pygmy Possum, Grey-headed Flying Fox, Koala and Southern Brown Bandicoot.

Five threatened species occurring closest, or in the vicinity, of the site include the following (See Appendix 3 for habitat assessment):

1. Powerful Owl (*Ninox strenua*) The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.

   The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species (DPIE 2020).

   The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl (DPIE 2020).

   Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400ha can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha (DPIE 2020).

   The Powerful Owl may forage in the area of the subject land from time to time (Figure 14) and occur as an infrequent visitor due to the cleared open structured vegetation but the as no trees will be removed or further clearing of the IPA required, this will not affect the life-cycle or viability of populations of the Powerful Owl in the locality. No hollows large enough for potential nesting by the Powerful Owl occur within the area of study within the APZ.

2. Grey-headed Flying Fox (*Pteropus poliocephalus*). This species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. The species feeds on the blossoms of more than 80 plant species, especially eucalyptus blossom and the fruits of a number of palm species. Flowering species of eucalypts such as Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus tereticornis)* and Paperbarks (*Melaleuca quinquenervia*), are particularly important. Distances of up to 30km from the camp are often travelled, with 60-70km sometimes covered per night to reach a particular food source.

The Grey-headed Flying Fox (*Pteropus poliocephalus)* was not sighted during the survey, which occurred during mid-morning when the bats would be roosting in camps, but may be attracted to flowering Eucalyptus trees on occasion during warmer months.

The habitat for this species may occur at the subject site as it forages for nectar within the tree canopy (Figure 15). It is considered that as the tree population will not be impacted and has a large foraging range in the locality, this species will not be compromised by the development proposed for the subject site (DPIE 2020).

3. Southern Brown Bandicoot - The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland.

   Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.

   They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil.

   Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares.

   Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees *Xanthorrhoea* spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.

   The habitat for this species is not expected to occur as the shrub and ground cover of the area has been removed in compliance with the 10/50 Rule (NSW RFS 2015) (Figure 15). However, this species has been recorded mainly in conservation reserves such as Ku-ring-gai Chase National Park (Figure 13) The structurally and floristically modified understorey habitat of the subject site is unsuitable, such that it is highly unlikely that the species will be compromised by the proposed development, which in any case, will not incur any further impacts (DPIE 2020).

4. Eastern Pygmy Possum - The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it's distribution extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes (DPIE 2020).

   The species is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.

Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksia and soft fruits are eaten when flowers are unavailable.
Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks (DPIE 2020).

Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.7 hectares and females about 0.35 hectares.
Young can be born whenever food sources are available, however most births occur between late spring and early autumn.

Pygmy Possums are agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal.

Frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.

The habitat for this species is not expected to occur as the shrub and ground cover of the area has been removed in compliance with the 10/50 Rule (NSW RFS 2015) (Figure 15). However, this species has been recorded in high numbers in bushland retained along Mona Vale Road (Figure 13). The structurally and floristically modified understorey habitat of the subject site is unsuitable, such that it is highly unlikely that the species will be compromised by the proposed development, which in any case, will not incur any further impacts (DPIE 2020).

5. Red-crowned Toadlet - The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains (DPIE 2020).

   The species occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.

   Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5 (DPIE 2020).

   Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg.

Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.

Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site.

The habitat for this species does not occur at the subject site but populations have been recorded widely in the locality (Figure 14). It is highly unlikely that the species will be compromised by the proposed development in relation to foraging and breeding behaviours. The proposed development will not incur any further impacts (DPIE 2020).

Other threatened species occurring in the vicinity of the site include the following (See Appendix 3 for habitat assessment):

1. Koala - Occurs in natural eucalypt forests and woodlands. Koala feed trees listed under Schedule 2 of SEPP 44 legislation include: Forest red gum *Eucalyptus tereticornis;* Tallowwood, *Eucalyptus microcorys*; Grey Gum, *Eucalyptus punctata*; Manna Gum, *Eucalyptus viminalis*; River Red Gum, *Eucalyptus camaldulensis*; Broad-leaved Scribbly Gum, *Eucalyptus haemastoma*; Scribbly gum, *Eucalyptus signata*; White box, *Eucalyptus albens*; Bimble box, *Eucalyptus populnea* and Swamp Mahogany, *Eucalyptus robusta.*

   On the subject land bounded by the APZ (Figure 2) there are only four immature individuals of Grey Gum, an accepted primary food tree (SEPP 44), comprising only 13% of the total canopy species population so the land does not represent optimal Koala habitat (SEPP 44) .

   No characteristic scratch marks were observed on any trees of Grey Gum and no Koala scats were evident. The tree distribution is vey sparse (Figures 5 & 6) and the ground stratum consists of exotic grassland, and as such, the Koala is highly unlikely to occur within this highly modified structural and floristic habitat (Figure 15).

2. Large-Bentwing Bat - This sub species of Bentwing Bat occurs from Cape York to central Victoria. Occurs in wet and dry sclerophyll forests and rainforests. May roost within man-made structures. Known roost sites include caves, disused mines, storm-water drains, culverts and buildings. However maternity roosts occur in deep sandstone or limestone cave systems. Will form scattered smaller colonies, mostly within 300km of the larger maternity cave (Churchill 1998).

This species is active all year round, foraging mostly on moths above the tree canopy. Feeds over large areas of land and has been reported to travel up to 70 km in one night (Dwyer 1995)

The highly structurally modified area of the subject site is not optimal foraging habitat but may the bat overfly the area on occasion to forage. The proposed development will not impact on this species. One record occurs about 570m to the south at Tumbledown Dick (Figure 16). Most records occur to the south and east such as at Warriewood, as is the case for the smaller, Little Bent-wing Bat (Figure 16).

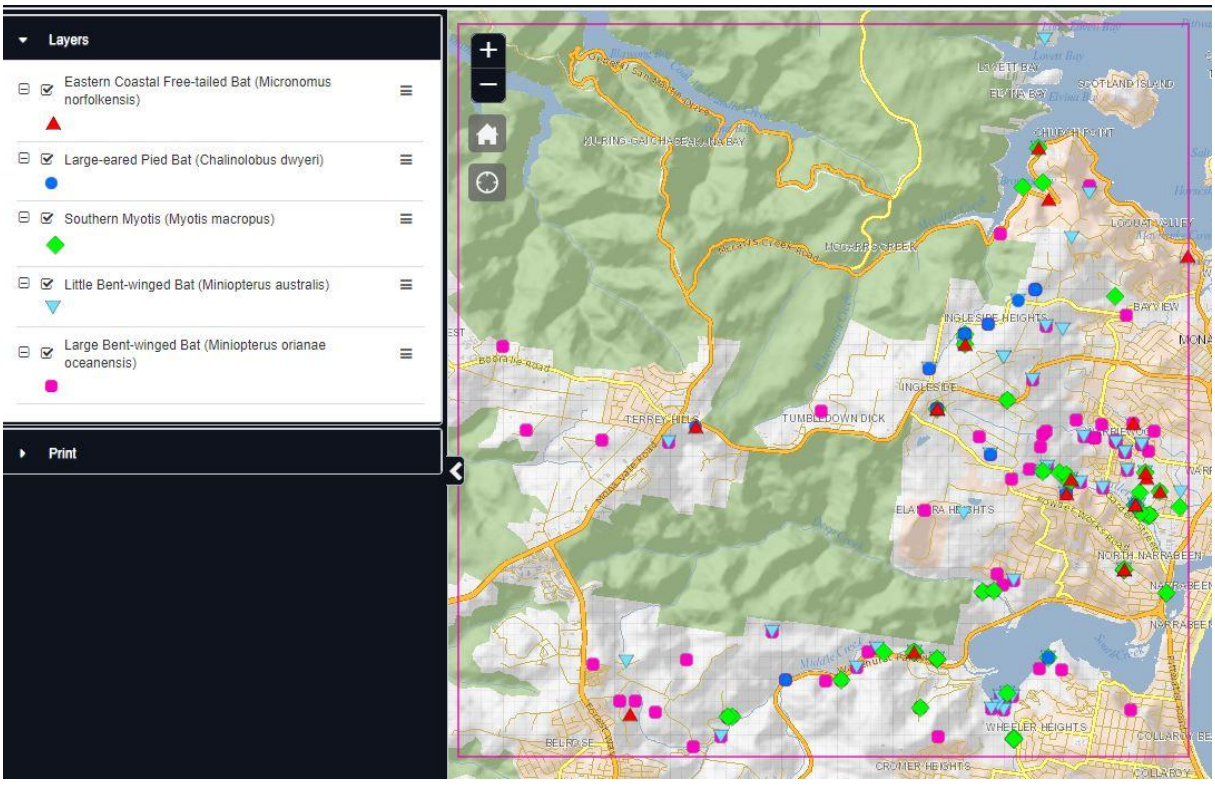

Figure 16 - Indicates recorded sightings of 5 threatened microchiropteran species in the locality of the subject site, including the Large-Bentwing Bat, Little Bentwing Bat, Large Pied-ear Bat, Eastern Coast Freetail Bat and the Southern Myotis

3. <u>Glossy Black Cockatoo</u> - Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of She-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur.

   Forest She-oak is the preferred foraging resource. Roosts in the canopy of tall trees, occasionally in tree hollows. Nests in deep hollows in eucalypts.

   There are very few individuals of Black Sheoak (*Allocasuarina littoralis*) occurring at or in the vicinity of the subject site (Appendix 1) and none will be removed. As no individuals of Glossy Black-cockatoos were recorded and no chewed cones or evidence of feeding was noted, the likelihood of this species being impacted by the development is highly unlikely. the nearest record occurs some 5.1km to the south-east at Narrabeen (Figure 14).

4. Squirrel Glider - The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Within Sydney the species is only known on the Barrenjoey Peninsula and in the Kurrajong-Wilberforce area

Inhabits dry sclerophyll forests and woodlands but is generally absent from rainforests and closed forests (Menkhorst and Collier 1988). Coastal habitats range from low, scrubby eucalypt woodlands and Banksia thickets to tall, wet eucalypt forests bordering on rainforest (Lindenmayer 2002). In coastal New South Wales they typically inhabit areas with a diversity of tree and shrub species, including high nectar-producing species and winter-flowering species.

The diet of the Squirrel Glider consists of sap from wattle and eucalypt trees, invertebrates, nectar and pollen (Lindenmayer 2002). During winter when other food sources are scarce the Squirrel Glider may obtain its energy from winter flowers of a number of plant species. Favoured within the Pittwater area is Coastal Banksia, Old Man Banksia, Grey Ironbark, Red bloodwood, Spotted Gum and Sydney Red Gum.

The subject site is highly structurally and floristically modified. Foraging source within the property for the Squirrel Glider are insects and potential sap flows from Sydney Red Gum. No foraging activity was recorded and nor were any individuals of Red Bloodwood observed within the subject APZ area of the land (Appendix 1). The nearest record occurs about 2km to the south-west near Terrey Hills (DPIE 2020).

4 POTENTIAL IMPACTS AND COMPLIANCE WITH DEVELOPMENT IN PITTWATER COUNCIL LGA

4.1 Introduction

Residential development must comply with Pittwater Council LEP (2014) and Pittwater Council 21 DCP (2014). This plan applies to all land within the Pittwater Council LGA to which LEP 2014 applies.

4.2 Pittwater Council LEP (2014)

Clause 7.6 refers to the following:

> (1) The objective of this clause is to maintain terrestrial, riparian and aquatic biodiversity by: (a) protecting native fauna and flora, and (b) protecting the ecological processes necessary for their continued existence, and (c) encouraging the conservation and recovery of native fauna and flora and their habitats.
>
> (2) This clause applies to land identified as "Biodiversity" on the Biodiversity Map. The land at 13 Bungendore Street, Ingleside, is included in the overall marking of Biodiversity on the Pittwater Council Biodiversity Map (current at 2020)
>
> (3) The consent authority must consider: (a) whether the development is likely to have: (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land,
>
> **Comment:** The proposal to convert a current established farm shed building to a farm stay accommodation building is not likely to impact on any element of the biodiversity of the flora or fauna of the subject land. The ground cover and understorey of the subject land within the prescribed IPA, which is included within the clearing recommended to comply with that undertaken for the 10/50 Rule (NSW RFS 2015), has been removed and replaced with a top-dressed soil sown to pasture grassland including Winter Grass and Perennial Ryegrass (Figures 5 & 6).
>
> (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna,
>
> **Comment:** The proposal to convert the current farm shed building to a farm stay accommodation building will not require the removal of any trees on the subject land and will not impact on the potential survival of any native fauna. Sheltering potential for avifauna and arboreal mammals could be enhanced by the installation of some nest boxes and bat boxes on suitable canopy trees occurring at the subject land.

(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land,

Comment: The land is already highly modified, floristically, structurally and in functionality where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) in to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land or act to further fragment or diminish the current biodiversity elements of the subject land.

(iv) any adverse impact on the habitat elements providing connectivity on the land,

Comment: The land is already highly modified, floristically, structurally and in functionality where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) in to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land or act to lead to any further impact on habitat elements providing connectivity, particularly in regard to the tree population on the subject land.

(3) The consent authority must consider whether (b) there any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Comment: The land is already highly modified, floristically, structurally and in functionality where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land or act to further fragment or diminish the current biodiversity elements of the subject land.

A mitigation measure to enhance fauna habitat at the current open woodland would be to install some nest boxes for avifauna and arboreal mammals and some bat boxes for microchiropterans.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or (b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed

to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

The land is already highly modified, floristically, structurally and in functionality where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land or act to further fragment or diminish the current biodiversity elements of the subject land.

4.3 Pittwater Council 21 DCP (2014)

One of the aims of this DCP is to ensure that controls relating to biodiversity conservation and vegetation and wildlife management are undertaken when any development is proposed in areas containing natural bushland. The objective to maintain terrestrial biodiversity aims to ensure the following (Pittwater 21 DCP):

- protection of native fauna and flora,
- protection of ecological processes necessary to maintain their continued existence, and
- the encouragement of the conservation and recovery of native fauna and flora and their habitats.

This aim serves to protect and conserve the biodiversity of the local area through the retention of natural vegetation where applicable and to maintain, enhance and/or establish wildlife corridors that enable existing plant and animal communities to survive and potentially expand their range where possible (Pittwater Council 21 DCP 2014).

In regard to the proposed development, the land is already highly modified, floristically, structurally and in functionality where understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not require the removal of any trees, other vegetation or rock features from the land or act to further fragment or diminish the current biodiversity elements of the subject land.

4.4 Proposed impacts to floristic biodiversity

4.4.1 Potential impacts of development

In regard to the proposed development, the land is already highly modified, floristically, structurally and in functionality. Understorey vegetation and natural ground cover has been removed and replaced with an exotic sown pasture grassland in compliance with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection for the current farm shed structure and other

surrounding built structures (Figures 5 & 6). The proposal to convert a farm shed building to a farm stay accommodation building will not impact further on any elements of biodiversity and will not require the removal of any trees, other vegetation or rock features from the land.

4.4.2 Recommended mitigation measures

Potential habitat for avifauna and microbats could be enhanced by the installation of several nesting boxes and bat boxes on suitable canopy individuals existing at the subject site.

4.5 Compliance with Threatened Species Legislation

4.5.1 Threatened species

No individuals of flora or fauna were recorded at or expected to occur the subject site.

Any bush rock, hollow logs and dead trees should be left intact as these may provide safe refuge and shelter for many fauna species.

4.5.2 Threatened Ecological Community

Results of assessment of landscape elements including position along slope, presence of ironstone layers in upper soil profiles, floristic elements of diagnostically positive and negative species and species favouring particular ecological communities, as well as previous and current mapping by authoritative government and other sources, indicate that the remnant community occurring at the subject land is a highly structurally and floristically modified assemblage of Sydney North Exposed Sandstone Woodland (OEH 2016, DPIE 2020).

This community appears sufficiently different in floristic composition, canopy dominants and landform elements to Sydney Ironstone Red Bloodwood - Silvertop Ash Forest (or Duffys Forest), another sandstone-based community which is commonly associated with ironstone gravels on crests and ridgelines such as occur along Mona Vale Road (Table 1).

Sydney North Exposed Sandstone Woodland is not listed on registers of the BC Act (2016) or EPBC Act (1999) and occurs commonly in many reserves in the northern Sydney region (OEH 2016).

4.6 Compliance with Effluent and Stormwater Disposal

The site is serviced by effluent and storm water infrastructure.

4.7 Conclusions

With appropriate management of potential environmental constraints, the proposed development is considered to comply with the desired criteria in relation to Pittwater Council 21 DCP (2014).

5 ADDRESSING THE PROPOSED DEVELOPMENT IN RELATION TO THE BAM (BIODIVERSITY ASSESSMENT METHOD) AS REQUIRED BY THE BC ACT (2016)

5.1 Offset Scheme Thresholds

5.1.1 Area criteria

The threshold for clearing at the subject site, which includes a total area of some 2.6ha, above which the BAM and offsets apply is 0.5ha (BAM 2016).

Clearing of understory and ground cover vegetation has been undertaken to comply with the 10/50 Rule (NSW RFS 2015) and as such, no further clearing is required to convert the current farm shed building to a farm stay accommodation building.

The development does not meet the offset criteria in relation to area to potentially be impacted.

5.1.2 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all local developments, major projects or the clearing of native vegetation where the *State* Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 applies. Any of these will require entry into the Biodiversity Offsets Scheme if they occur on land mapped on the Biodiversity Values Map (DPIE 2020).

The location of the subject property on the Biodiversity Values Map is indicated in Figure 17.

The subject property is not indicated as containing any significant Biodiversity Value (Figure 17).

Figure 17 - Biodiversity Values Mapping of subject site at 13 Bungendore Street, Ingleside, (blue solid circle on map), showing no biodiversity values mapped for the subject land (biodiversity values are indicated in purple shading if present such as patches of Duffys Forest occurring near the Bahai Temple (south-east corner of map) and along other sections of Mona Vale Road (DPIE 2020).

5.1.3 Threatened species, populations and/or ecological communities.

There will be no impact to any threatened species, populations and /or ecological communities as a result of the proposed conversion of the current farm shed building to a farm stay accommodation building as no clearing is required for the proposal. No threatened species or ecological communities were assessed as occurring at the subject land.

The subject area occurs within the IPA of an area cleared of understory and ground cover of a likely highly floristically and structurally modified assemblage of Sydney North Exposed Sandstone Woodland containing a sparse cover of canopy trees, none of which require removal (Figures 5, 6 & 7).

6 REFERENCES AND LITERATURE REVIEWED

Bee & Lethbridge (2019) Survey Plan of Boundaries, Relative Heights and Physical Features of land at 13 Bungendore Street, Ingleside

Benson, D. and Howell, J. (1994) The natural vegetation of the Sydney 1: 100,000 map sheet. *Cunninghamia* **3**:677 – 787.

Benson, D. and Howell, J. (1990) Taken for Granted: The bushjland of Sydney and its suburbs. Kangaroo Press Pty Ltd

Briggs, J.D. and Leigh, J.H.C. (1996) Rare or Threatened Australian Plants: CSIRO Division of Plant Industry/Australian National Parks and Wildlife Service. CSIRO Publishing, Melb.

Chapman, G.A. and Murphy, C.L. (1989) *Soil landscapes of the Sydney 1;100 000 sheet.* (Soil Conservation Service of N.S.W.: Sydney).

Churchill, S., (1998). *Australian Bats*. Reed New Holland Publishers.

Cogger, H. G. (2000). Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.

Commonwealth DAWE Protected Matters Environmental Search Tool (2020)

Cropper, S (1993) *Management of Endangered Plants* CSIRO Pub. East Melbourne

DEC (2002) *Final Edition of 'Native Vegetation of the Cumberland Plain'*. Conservation Programs and Planning Division, Central Directorate.

DEC (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities

DEC (2005) Recovering Bushland on the Cumberland Plain

DECCW (2011) Cumberland Plain Recovery Plan.

DPIE Atlas of NSW Wildlife (2020). NPWS Geographic Information Systems Division, Hurstville NSW, 2220.

Dwyer, P.D. (1995) Common Bentwing-bat *Miniopterus schreibersii* Pp. 494-5 in Strahan, R. (ed.) The Mamals of Australia. Reed Books, Sydney.

Fairley, A. & Moore, P. (2010) Native Plants of the Sydney District – An Identification Guide. Kangaroo Press, Kenthurst, Sydney.

Fairley, A. (2004) Seldom Seen – Rare Plants of Greater Sydney. New Holland Publ Sydney, Aust.

Fomin, N (Planning and Environment Services) (2019) Bushfire Safety Authority for SFPP – Farm Stay Accommodation 13 Bungendore Street INGLESIDE NSW 2101, 166//DP752046

Gibbons P, Lindenmayer D (2000) 'Tree Hollows and Wildlife Conservation in Australia'. (CSIRO Publishing: Canberra)

Gunninah Environmental Consultants (1999) in Smith, P. and Smith, J. (2000) Survey of the Duffys Forest Vegetation Community. Report to NSW National Parks and Wildlife Service and Warringah Council.

Harden, G. J. (ed.) (1990 – 2002; 2020 online) Flora of New South Wales, Royal Botanic Gardens, Sydney NSW.

Harris Environmental Consulting (2020) Re: Farm Stay (DA2019/1381) - APZ standard for 13 Bungendore Street, Ingleside

Herbert, C. (1983) '*Geology of the 1:100 000 Sheet 9130'.* Geological Survey of NSW, Sydney.

Lumsden, L.F. and Menkhorst, P. (1995) Yellow-bellied Sheathtail-bat. Pp 161-2 in Menkhorst, P.W. (ed.) Mammals of Victoria. Oxford University Press, Melbourne.

Menkhorst, P & F Knight (2001). *A field guide to the Mammals of Australia*. Victoria: Oxford University Press.

Nolan Planning Consultants (2019) Statement of Environmental Effects 13 Bungendore Street, Ingleside - change of use from an existing farm building to farm stay accommodation

NSW Building Approvals (2020) BCA Compliance Assessment Report for Proposed Farm Stay Accommodation 13 Bungendore Street, Ingleside

NSW Government (2018) Bush fire related clearing and the Biodiversity Conservation Act 2016

NSW Scientific Committee. Final Determinations (1996 – 2020) Determinations relating to listings of threatened species, ecological communities and key threatening processes in the Schedules of the *Biodiversity Conservation Act 1995.*

OEH (2016) 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area'.

Pizzey, G. and Knight, F. (2003). *The Field Guide to the Birds of Australia.* Angus and Robinson Publs.

Smith A.P & Murray (2002) Habitat requirements of the squirrel glider (*Petaurus norfolcensis*) and associated possums and gliders on the New South Wales central coast. *Wildlife Research* 30(3) 291-301

Smith, P. and Smith, J. (2000) Survey of the Duffys Forest Vegetation Community. Report to NSW National Parks and Wildlife Service and Warringah Council.

Specht, R. L., Specht, A., Whelan, M.B., Hegarty, E. E. (1995) Conservation Atlas of Plant Communities in Australia. Southern Cross Univ Press Lismore

Strahan, R. 1995 *Complete Book of Australian Mammals*, Second Edition. Sydney: ReedBooks.

Appendix 1: Floristic species assemblage recorded at 13 Bungendore Street, Ingleside

KEY

Status

* Exotic species
HTE - High Threat Exotic (OEH 2020)
- Occur within subject land but outside 20 x 20m quadrat

Vegetation
Highly floristically, structurally and functionally modified vegetation of assemblage of Sydney North Exposed Sandstone Woodland (DPIE 2020)

Relative cover value (% cover) and where relevant, number of trees

STATUS	SCIENTIFIC NAME	COMMON NAME	TREE CANOPY OVER EXOTIC GRASSLAND GROUND COVER (Figures 5 & 6)	SMALL AREA (20m x 20m) OF EXPOSED ROCK SHELF ON LOWER SLOPES (Figure 7)
	MAGNOLIOPSIDA: MAGNOLIDAE			
	Asteraceae			
*	*Bidens pilosa*	Cobblers Pegs	0.5	
	Casuarinaceae			
	Allocasuarina littoralis	Black Sheoak	1 tree	
	Cunoniaceae			
	Ceratopetalum gummiferum	Christmas Bush	#	
	Ericaceae			
	Epacris pulchella	NSW Coral Heath		1
	Woollsia pungens	Woollsia		1
	Euphorbiaceae			
HTE	*Ricinus communis*	Castor Oil Plant	1	
	Fabaceae: Faboideae			
	Hardenbergia violacea	False Sarsaparilla	#	
	Fumariaceae			
*	*Fumaria muralis*	Wall Fumitory	1	

STATUS	SCIENTIFIC NAME	COMMON NAME	TREE CANOPY OVER EXOTIC GRASSLAND GROUND COVER (Figures 5 & 6)	SMALL AREA (20m x 20m) OF EXPOSED ROCK SHELF ON LOWER SLOPES (Figure 7)
	Goodeniaceae			
	Dampiera stricta	Blue Dampiera		1
	Lamiaceae			
*	*Stachys arvensis*	Stagger Weed	1	
	Mimosaceae			
	Acacia oxycedrus	Spike Wattle	#	
	Acacia suaveolens	Sweet Wattle	#	
	Acacia ulicifolia	Prickly Moses		1
	Myrtaceae			
	Angophora costata	Sydney Red Gum	14 trees	2 trees
	Eucalyptus punctata	Grey Gum	4 trees	2 trees
	Eucalyptus sieberi	Silvertop Ash	2 trees	
	Eucalyptus umbra subsp. *umbra*	Bastard Mahogany	10 trees	1 tree
	Picrodendraceae			
	Micrantheum ericoides	Heath Micrantheum		1
	Proteaceae			
	Persoonia pinifolia	Pine-leaved Geebung	#	
	Rutaceae			
	Boronia ledifolia	Sydney Boronia		1
	Eriostemon australasius	Pink Wax Flower		1
	Solanaceae			
*	*Solanum nigrum*	Black Nightshade	0.5	
	Vitaceae			
	Cayratia clematidea	Slender Grape	#	
	MAGNOLOPSIDA: LILIDAE			
	Cyperaceae			
	Cyathochaeta diandra	Sheath Rush		1
*	*Cyperus eragrostis*	Umbrella Sedge	1	
	Schoenus imberbis	Beardless Bog-rush		1

STATUS	SCIENTIFIC NAME	COMMON NAME	TREE CANOPY OVER EXOTIC GRASSLAND GROUND COVER (Figures 5 & 6)	SMALL AREA (20m x 20m) OF EXPOSED ROCK SHELF ON LOWER SLOPES (Figure 7)
	Lomandraceae			
	Lomandra glauca	Pale Mat-rush		1
	Lomandra longifolia	Spiky-headed Mat-rush	#	
	Orchidaceae			
	Cryptostylis erecta	Large Tongue Orchid	#	1
	Phormiaceae			
	Dianella caerulea	Blue Flax Lily		1
	Poaceae			
*	*Andropogon virginicus*	Whiskey Grass		2
*	*Cynodon dactylon*	Couch	10	
	Entolasia stricta	Wiry Panic		1
	Eragrostis brownii	Browns Lovegrass		1
*	*Lolium perenne*	Perennial Ryegrass	45	
*	*Poa annua*	Winter Grass	45	
	Restionaceae			
	Leptocarpus tenax	Slender Twine-rush		1
	Xanthorrhoeaceae			
	Xanthorrhoea media	Forest Grass-tree		5

Appendix 2: Plant species of conservation significance recorded within a 5km radius of the surveyed area since 2000 where potential habitat may occur (DPIE Bionet Atlas of NSW Wildlife 2020$^{\alpha}$) or where potential habitat is deemed to potentially occur (Commonwealth Environmental Reporting Tool 2020$^{\beta}$)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in surveyed areas	Reference material derived from 'Final Determinations' (Scientific Committee) and others listed below:
Callistemon linearifolius $^{\alpha}$		V	2RCi	Erect shrub to 2.5m tall. Occurs in damp situations in woodland or scrub on sandstone substrates	**Unlikely** - Habitat unsuitable. Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required**.	DPIE Atlas of NSW Wildlife (2020); Robinson (2000), James *et al* (1999)
Epacris purpurascens $^{\alpha}$	V*	V	2KC-	Erect shrub to 150cm tall, in dry sclerophyll forest. Occurs on damp soils in woodland and forest on sandstone, shale or rocky sites, confined to coastal plateaus in the Sydney region from Gosford to Sydney district.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Atlas of NSW Wildlife (2020); Robinson (2000), Fairley (2004)
Eucalyptus camfieldii $^{\alpha}$	V*	V	2VCi	Mallee or small tree 1 – 4m tall. Occurs on shallow sandstone soils bordering coastal heath in association with other mallee eucalypts.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020); Fairley & Moore (2004), Harden (2002)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in surveyed areas	Reference material derived from 'Final Determinations' (Scientific Committee) and others listed below:
Genoplesium baueri $^{\alpha\,\beta}$		V	3RC-	Terrestrial orchid to 15cm tall, occurs in sparse sandy dry sclerophyll forest habitat and moss outcrops over sandstone.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. Often associated with ironstone gravels, none of which occur at subject site **No further assessment required at present**	DPIE Atlas of NSW Wildlife (2020), Robinson (2000), Fairley (2004).
Grammitis stenophylla $^{\alpha}$		E1		Small erect fern with fronds <5cm long. Occurs on rocks in rainforest and in wet sclerophyll forest	**Unlikely**: Habitat unsuitable **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020); Harden (2000)
Grevillea caleyi $^{\alpha\,\beta}$	E*	E1	2ECi	Large bushy shrub to 3m tall, occurs in sandy soils in open forest.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. Often associated with ironstone gravels, none of which occur at subject site. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020); Fairley & Moore (2004)
Kunzea rupestris $^{\beta}$	V*	V	2VCa	Clonal shrub to 1.5m tall, occurring in heath on rock platforms	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020); Robinson (2000)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in surveyed areas	Reference material derived from 'Final Determinations' (Scientific Committee) and others listed below:
Lasiopetalum joyceae α	V*	V	2RC-	Erect shrub to 1 to 2m tall, occurring on lateritic to shaley ridgetops on the Hornsby Plateau.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. Often associated with ironstone gravels, none of which occur at subject site. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Atlas of NSW Wildlife (2020); Robinson (2000); Fairley (2004)
Persoonia hirsuta subsp *hirsuta* α β	E*	E1	3KCi	Spreading to decumbent shrub found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	OEH Atlas Of NSW Wildlife (2020); James et al (1999); Fairley & Moore (2000); Fairley (2004).
Microtis angusii α	E*	E1	2E	Terrestrial orchid to 60cm tall, flowering between May and October. Habitat of recorded site in vicinity of subject site is heavily disturbed. Natural habitat unknown but may have been introduced from nearby Duffys Forest Ecological Community	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. Nearest records are about 5.7km to the south-west in Garigal National Park and about 5.2km to the south-east along Pittwater Road, North Narrabeen **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in surveyed areas	Reference material derived from 'Final Determinations' (Scientific Committee) and others listed below:
Pimelea curviflora var curviflora $^{\alpha}$	V*	V		Much-branched subshrub or shrub 20 to 100cm. Occurs in woodlands of the northern area of Sydney on shale-sandstone transition areas and laterite soils.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020); James et al (1999)
Prostanthera densa $^{\alpha}$	V*	V	3VC-	Compact shrub to 2m tall, occurs on a few coastal headlands and nearby ranges on sandstone outcrops and in sandy heath.	**Highly unlikely:** Habitat unsuitable. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020), Robinson (1994), Fairley (2004).
Rhodamnia rubescens $^{\alpha}$		E4A		Shrub or small tree to 25 m high with reddish/brown, fissured bark (OEH 2019). Occurs in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils (OEH 2019).	**Unlikely** – Habitat unsuitable. **No further assessment required.**	DPIE Bionet Atlas of NSW Wildlife (2020)
Syzygium paniculatum $^{\alpha\,\beta}$	V*	V	3VCi	Shrub or small tree to 8m tall, occurs in or near rainforest from littoral sands to sheltered gullies, especially near watercourses on sandy soils	**Unlikely** – Habitat not suitable. The absence of conspicuous large-life form individuals of this species indicates non-occurrence. **No further assessment required**.	DPIE Bionet Atlas of NSW Wildlife (2020); Robinson (1991), Fairley & Moore (2000)

Scientific Name	Status (EPBC Act 1999)	Status (BC Act 2016)	RoTAP	Habit/potential habitat/general geographic location	Likelihood of occurrence in surveyed areas	Reference material derived from 'Final Determinations' (Scientific Committee) and others listed below:
Tetratheca glandulosa $\alpha\,\beta$	V*	V	2VC-	Small erect shrub to 50cm high, branching close to the woody rootstock, found in sandy and rocky heath, scrub and woodland north of Sydney Harbour.	**Unlikely** - Understory and ground cover of subject site removed to comply with the 10/50 Rule (NSW RFS 2015) to afford bushfire protection. The absence of relatively distinct life-form individuals in area of study indicates non-occurrence. **No further assessment required at present**	DPIE Bionet Atlas of NSW Wildlife (2020), Fairley & Moore (2004), Robinson (2000), Fairley (2004).

Key to Conservation Status:

Commonwealth legislation

Environmental Protection and Biodiversity Conservation Act, 1999
EX – Presumed extinct
E* - Endangered
V* - Vulnerable

NSW legislation

Biodiversity Conservation Act, 2016

E4A – Schedule 1 Part 1 – Presumed extinct, recently recorded
E1 Schedule 1 Part 1 – Endangered
V Schedule 2 - Vulnerable

RoTAP

Conservation code
2 - geographic range <100km
3 - geographic range >100km

Conservation status
E - endangered to point of extinction if current land use and other threats continue to operate
V - vulnerable, at risk of depletion over 20-50- years if land use that threatens survival is maintained
C - at least one population conserved in a national park or proclaimed conservation area

Size class of reserved populations

a - >1000 plants in conservation reserve
i - < 1000 plants in conservation reserve
- reserved population size not accurately known

Appendix 3 - Likelihood of occurrence of some fauna species of conservation significance recorded within a 5km radius of the Study Area at 13 Bungendore Street, Ingleside (DPIE Bionet Atlas of NSW Wildlife 2020) or where potential habitat is deemed to potentially occur (DAWE 2020).

Amphibians	**BC Act**	**EPBC Act**	**Habitat**	**Record (source)**	**Likelihood of Occurrence**	**Assessment of Significance required**
Red-crowned Toadlet *Pseudophryne australis*	V		Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones at the sandstone-shale interface. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	86 DPIE Bionet Atlas (2020)	**Highly unlikely -** habitat highly modified; no suitable habitat on the subject land.	No
Giant Burrowing Frog *Heleioporus australiacus*	V	V	**Distribution;** The Giant Burrowing Frog occurs from the NSW Central Coast to eastern Victoria, but is most common on the Sydney sandstone. It has been found from the coast to the Great Dividing Range. **Habitat;** Found in heath, woodland and open forest with sandy soils. Generally lives in the heath or forest and will travel several hundred metres to creeks to breed. Burrows into deep litter or loose soil, emerging to feed or breed after rain. **Breeding;** Breeds from August to March and the eggs are laid in a white foam-mass under vegetation in creeks or in yabby holes. **Feeding;** Diet includes ground-dwelling invertebrates such as ants, beetles and spiders.	40 DPIE Bionet Atlas (2020)	**Highly unlikely -** habitat highly modified; no suitable habitat on the subject land.	No
Birds	**BC Act**	**EPBC Act**	**Habitat**	**No sighted (source)**	**Likelihood of Occurrence**	**Assessment of Significance required**
Superb Fruit Dove *Ptilinopus superbus*	V		**Distribution**; The Superb Fruit-Dove is found along the coast and nearby ranges of Queensland and New South Wales south to Moruya. **Habitat;** Inhabits rainforest, wet schlerophyll forest. Open forest and sometimes mangroves of eastern Australia. Uncommon to rare south of Keppel Bay, Queensland (Pizzey & Knight 1997). **Breeding;** Rarely breeds (if ever) in New South Wales or Victoria. Nests in October to January on a small frail platform of twigs, on a horizontal fork in a tree, between 5-1- metres from the ground	2 DPIE Bionet Atlas (2020)	**Highly unlikely -** habitat highly modified; no suitable habitat on the subject land.	No

			(Beruldsen 2003). **Feeding;** eats the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.			
White-bellied Sea-Eagle *Haliaeetus leucogaster*	V	C	Low potential for habitat to occur at site. Occurs in wooded areas near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest. May overfly site on occasion.	22 DPIE Bionet Atlas (2020)	**Low -** May overfly the area as part of a wider foraging range	No
Little Eagle *Hieraaetus morphnoides*	V		The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest. The Little Eagle searches for prey on the wing or from a high exposed perch, taking prey from the ground, the shrub layer or the canopy. Prey includes rabbits, other live mammals and insects. *May overfly the area as part of a wider foraging range but will not be affected by the development.*	5 OEH Bionet Atlas (2020)	**Low - Moderate -** May overfly the area as part of a wider foraging range	No
Square-tailed Kite *Lophoictinia isura*	V		In NSW the Square-tailed Kite is often associated with ridge and Gully forests dominated by Woollybutt *Eucalyptus longifolia,* Spotted Gum *Eucalyptus maculata,* or Peppermint Gum *Eucalyptus elata.* It has also been sighted in forests containing *Angophora spp*.and *Callitris spp* with a shrubby understorey and Box-Ironbark woodland. It feeds on honeyeating birds and insects in the tree canopy. They have a large foraging range and hunt prey early morning and evening. Nesting sites are along or close to watercourses in a fork or large horizontal limb of a *Eucalyptus* or *Angophora* species (Pizzey and Knight 2003). *An infrequent visitor to bushland areas surrounding the subject site. No breeding habitat available and only marginal foraging and roosting habitat available. Therefore, the subject site is not regarded as core habitat for this species.*	4 DPIE Bionet Atlas (2019)	**Low-**no suitable habitat on the subject land.	No

Birds	**BC Act**	**EPBC Act**	**Habitat**	**No sighted (source)**	**Likelihood of Occurrence**	**Assessment of Significance required**
Gang Gang Cockatoo *Callocephalon fimbriatum*	V		Has a preference for wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens.	2 DPIE Bionet Atlas (2020)	**Low -**no suitable habitat on the subject land	No
Glossy Black Cockatoo *Calyptorhynchus lathami*	V		Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. Forest She-oak is the preferred foraging resource. Roosts in the canopy of tall trees, occasionally in tree hollows. Nests in deep hollows in eucalypts. *Few individuals of Allocasuarina littoralis occur at or in the vicinity of the subject site and none will be removed. As no Glossy Black-cockatoos were recorded and no chewed cones or evidence of feeding was noted, the likelihood of this species being impacted by the development is unlikely*	96 DPIE Bionet Atlas (2020)	**Low -**no suitable habitat on the subject land.	No
Little Lorikeet *Glossopsitta pusilla*	V		Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. Little lorikeets are considered to be nomadic, likely in a response to food availability. These lorikeets usually forage in small flocks, feeding mainly on nectar and pollen, but also fruit of eucalypts, melaleucas and mistletoes. The little lorikeet breeds from May to September, nesting in tree hollows, with small diameter entrance holes. Most breeding records are located on the western slopes. *May forage in the subject site with other species of lorikeets during peak flowering events.*	12 DPIE Atlas of NSW Wildlife (2020)	**Low -** more likely to occur within Ku-ring-gai and Garigal National Parks where there is undisturbed forested areas overlooking gully vegetation.	No

Birds	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Swift Parrot *Lathamus discolor*	E1	CE	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Winter migrant to coastal NSW where they feed in the following trees; Swamp Mahogany (*E. robusta)*, Forest Redgum (*E. tereticornus*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*Corymbia gummifera).*	17 DPIE Atlas of NSW Wildlife (2020)	**Low -** habitat unsuitable. Sighted about 1km to the north-east in Ku-ring-gai Chase National Park	No
Black-chinned Honeyeater (Eastern subspecies) *Melithreptis gularis gularis*	V		The eastern subspecies extends south from central Queensland, through NSW, Victoria into south eastern South Australia, though it is very rare in the last state. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. A gregarious species usually seen in pairs and small groups of up to 12 birds. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects.	1 DPIE Bionet Atlas (2020)	**Low -** no suitable habitat on the proposed development area of the subject land.	No

Birds	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Varied Sittella *Daphoenositta chrysoptera*	V		Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	3 DPIE Bionet Atlas (2020)	**Low -** suboptimal habitat on the proposed development areas of the subject land. In any case, no trees will be removed.	No
Powerful Owl *Ninox strenua*	V		Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda,* Cherry Ballart *Exocarpus cupressiformis* and a number of other eucalypt species. *No evidence (presence of pellets or droppings at base of trees or on tree trunks) of this species using the subject site for roosting. The subject site is not regarded as core habitat for Powerful Owl.*	166 DPIE Bionet Atlas (2020)	**Low -** more likely to occur within tracts of forest where there are large areas of undisturbed bushland.	No
Scarlet Robin *Petroica boodang*	V		Foraging habitat at site surrounded by urbanisation has a low potential, the species inhabiting dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Low suitability for roosting at site surrounded by urbanisation. Prefers abundant logs and fallen timber which do not occur at the subject site. Low suitability for breeding, prefers ridges in dry eucalypt forest and woodland which do not occur at the site which is surrounded by urbanisation. *Not optimal habitat for the Scarlet Robin. The proposed development is not expected to impact on the foraging activity of this species.*	1 DPIE Atlas of NSW Wildlife (2020)	**Low -** more likely to occur where there are large areas of undisturbed forest.	No

Mammals	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Koala *Phascolarctus cinereus*	V	V	Occurs in natural eucalypt forests and woodlands. Koala feed trees listed under Schedule 2 of SEPP 44 legislation include: Forest red gum *Eucalyptus tereticornis;* Tallowwood, *Eucalyptus microcorys*; Grey Gum, *Eucalyptus punctata*; Manna Gum, *Eucalyptus viminalis*; River Red Gum, *Eucalyptus camaldulensis*; Broad leaved scribbly gum, *Eucalyptus haemastoma*; Scribbly gum, *Eucalyptus signata*; White box, *Eucalyptus albens*; Bimble box, *Eucalyptus populnea* and Swamp mahogany, *Eucalyptus robusta.* *On the subject land there are few primary food trees, so the land does not represent optimal Koala habitat.*	12 DPIE Atlas of NSW Wildlife (2020)	**Highly unlikely -** Nearest record about 1km to the north-west in Ku-ring-gai National Park. Habitat highly structurally and floristically modified; no suitable habitat on the subject land.	No
Southern Brown Bandicoot (eastern) *Isoodon obesulus obesulus*	E1	E	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees *Xanthorrhoea* spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	39 DPIE Atlas of NSW Wildlife (2020)	**Highly unlikely -** habitat highly structurally and floristically modified; no suitable habitat on the subject land. All records occur in Ku-ring-gai Chase National Park to the north-west of the subject site	No

Mammals	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Eastern Pygmy Possum *Cercartetus nanus*	V		The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria (Menkhorst & Knight 2001). It inhabits forests and woodlands with an overstorey of winter-flowering eucalypts (*Corymbia maculata, Eucalyptus robusta, Eucalyptus tereticornis)* or an understorey of winter-flowering Banksia (*Banksia spinulosa*) or pinnate-leaved Acacias (*Acacia irrorata*). The highest estimated numbers occur in association with Scribbly Gum (*Eucalyptus haemastoma*), Smooth-barked Apple (*Angophora costata*) Red Bloodwood (*Corymbia gummifera*) with an understorey of *Banksia spp*. and *Xanthorrhoea spp.* (Smith & Murray 2003) Squirrel Gliders require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (Menkhorst & Collier 1987, Gibbons & Lindenmayer 2002).	407 DPIE Atlas of NSW Wildlife (2020)	**Highly unlikely -** habitat highly structurally and floristically modified; no suitable habitat on the subject land. Many records within bushland along Mona Vale Road	No
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	Grey-headed Flying Fox (*Pteropus poliocephalus*). This species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. The species feeds on the blossoms of more than 80 plant species, especially eucalyptus blossom and the fruits of a number of palm species. Flowering species of eucalypts such as Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus.tereticornis)* and Paperbarks (*Melaleuca quinquenervia*), are particularly important. Distances of up to 30km from the camp are often travelled, with 60-70km sometimes covered per night to reach a particular food source. The Grey-headed Flying Fox (*Pteropus poliocephalus)* was not sighted during the survey, which occurred during mid-morning when the bats would be roosting in camps, but may be attracted to flowering Eucalyptus trees on occasion.	100 DPIE Bionet Atlas (2020)	**Low - Moderate-** May on occasion forage in the area as part of a wider foraging range in the locality. The proposed development will not impact on the Grey-headed Flying Fox.	No

Mammals	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Spotted-tailed Quoll *Dasyurus maculatus*	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites (Edgar & Belcher 1995).	8 DPIE Atlas of NSW Wildlife (2020)	**Highly unlikely -** no suitable habitat on the proposed development area of the subject land and in any case, no trees will be removed.	No
Squirrel Glider *Petaurus norfolcensis*	V		**Distribution;** The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Within Sydney the species is only known on the Barrenjoey Peninsula and in the Kurrajong-Wilberforce area **Habitat;** Inhabits dry sclerophyll forests and woodlands but is generally absent from rainforests and closed forests (Menkhorst and Collier 1988). Their coastal habitats range from low, scrubby eucalypt woodlands and banksia thickets to tall, wet eucalypt forests bordering on rainforest (Lindenmayer 2002). In coastal New South Wales they typically inhabit areas with a diversity of tree and shrub species, including high nectar-producing species and winter-flowering Species. **Breeding;** Births may occur throughout the year, usually with peak in winter. Most females exhibit the capacity to raise two litters per year. Young gliders disperse at a mean age of 12.5 months. **Feeding;** Diet consists of sap from wattle and eucalypt trees, invertebrates, nectar and pollen. (Lindenmayer 2002). During winter when other food sources are scarce the Squirrel Glider may obtain its energy from winter flowers of a number of plant species. Favoured within the Pittwater area is Coastal Banksia, Old Man Banksia, Grey Ironbark, Red bloodwood, Spotted Gum and Sydney Red Gum.	3 DPIE Bionet Atlas (2020)	**Low -** Subject site is highly modified. Foraging source within the property for the Squirrel Glider are insects and potential sap flows from Sydney red Gum. No foraging activity recorded.	No

Mammals	BC Act	EPBC Act	Habitat	No sighted (source)	Likelihood of Occurrence	Assessment of Significance required
Eastern Freetail Bat *Mormopterus norfolkensis*	V		Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Insectivorous.	19 DPIE Bionet Atlas (2020)	**Low -** Subject site is highly modified. May forage above the tree canopy for insects.	No
Large-eared Pied Bat *Chalinobus dwyeri*	V	V	These bats roost in shallow caves in escarpments, particularly in sandstone and forage in remnant native dry and wet open forests, woodlands and rainforests.	15 DPIE Bionet Atlas (2020)	**Low -** Subject development site is highly modified, habitat unsuitable. All records to the north-east oft he subject site	No
Eastern False Pipistrelle *Falsistellus tasmaniensis*	V		It occupies sclerophyll forests, particularly where the habitats are wet and where the tree heights are greater than 20 metres (Strahan 1995; Churchill 1998). The Eastern Falsistrelle roosts in tree hollows, and has also been recorded occupying caves in the Jenolan area (NSW). Known home ranges of 12 km have been recorded.	1 DPIE Atlas of NSW Wildlife (2020)	**Low-**not optimal foraging habitat on the subject land but may overfly the area on occasion to forage.	No
Little Bentwing Bat *Miniopterus australis*	V		Habitat in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and at night forage for small insects beneath the canopy of densely vegetated habitats.	52 DPIE Bionet Atlas (2020)	**Low-**Unsuitable foraging habitat on the subject land. Most records closer to the coast at Warriewood	No
Large Bentwing Bat *Miniopterus orianae oceanensis*	V		This sub species of Bentwing Bat occurs from Cape York to central Vic. Occurs in wet and dry sclerophyll forests and rainforests. Roost within man-made structures. Known roost sites include caves, disused mines, storm-water drains, culverts and buildings. However maternity roosts occur in sandstone or limestone cave systems. Will form scattered smaller colonies, mostly within 300km of the larger maternity cave (Churchill 1998). Active all year round, foraging mostly on moths above the tree	112 DPIE Bionet Atlas (2020)	**Moderate-**not optimal foraging habitat on the subject land but may overfly the area on occasion to forage. Proposed development will not impact on this species. One record about 570m to the south at Tumbledown	No

			canopy. Feeds over large areas of land and has been reported to travel up to 70 km in one night (Dwyer 1995) *The Large Bentwing Bat will not be impacted upon by the proposed development.*		Dick. Most records to the south and east such as at Warriewood	
Mammals	**BC Act**	**EPBC Act**	**Habitat**	**No sighted (source)**	**Likelihood of Occurrence**	**Assessment of Significance required**
Southern Myotis *Myotis macropus*	V		Prefers permanent and/or flowing water. The Southern Myotis is commonly a cave dwelling microchiropteran, but will utilise tree hollows, mines, stormwater drains, bridges and dense vegetation (Churchill 1998). Roosting sites can be located within a wide variety of habitats, usually located in close proximity to permanent, slow flowing water. Breeding occurs between November and December, with young being weaned after three to four weeks (Churchill 1998). The Southern Myotis commonly forages over water bodies for insects and small fish (Churchill 1998).	50 DPIE Bionet Atlas (2020)	**Low-**no foraging habitat on the development section of the subject land, but may forage at the dam to the north of the subject development area. Most records to the south and east such as at Warriewood.	No
Greater Broadnose Bat *Scoteanax ruepellii*	V		The preferred foraging habitat of this species appears to be tree-lined creeks and the interface between forested land and cleared areas. This species usually roosts in tree hollows, with large live or dead emergent hollow bearing trees preferred. The roof spaces of old buildings are also used as roost sites. The Greater Broad-nosed Bat has been observed to travel from a forested foraging area, several kilometres to a roost tree hollow adjacent to the edge of a town. A colony of up to 80 individuals was using the roost. Large, individual paddock trees have also been found to be used by this species. This indicates that an individual tree may be extremely important, at least on a seasonal basis.	5 DPIE Atlas of NSW Wildlife (2020)	**Low --** Habitat of cleared site unsuitable. May on occasion forage at the subject site as part of a wider foraging range. It is not expected that the Greater Broadnose Bat will be impacted upon by the proposed development.	No
New Holland Mouse *Pseudomys novaehollandiae*		**V**	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Genetic evidence indicates that the New Holland Mouse once formed a single continuous population on mainland Australia and the distribution of recent subfossils further suggest that the species has undergone a large range contraction since European settlement. Total population size of mature	1 DPIE Atlas of NSW Wildlife (2020)	**Low --** Habitat of cleared site unsuitable. It is not expected that the New Holland mouse will be impacted by the proposed	No

			individuals is now estimated to be less than 10,000 individuals although, given the number of sites from which the species is known to have disappeared between 1999 and 2009, it is likely that the species' distribution is actually smaller than current estimates. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes It is a social animal, living predominantly in burrows shared with other individuals Distribution is patchy in time and space, with peaks in abundance during early to mid stages of vegetation succession typically induced by fire		development.	
Reptiles	**BC Act**	**EPBC Act**	**Habitat**	**No sighted (source)**	**Likelihood of Occurrence**	**Assessment of Significance required**
Rosenburgs' Goanna *Varanus rosenburgi*	V		Restricted to the Sydney Basin and within a radius of 200km of Sydney. Its eastern most distribution is Royal National Park, Heathcote. The Broad-headed Snake has a preferred habitat centred on the communities occurring on the Triassic sandstone of the Sydney Basin. The sites where they occur are typified by exposed sandstone outcrops and benching and in these locations the vegetation is mainly woodland, open woodland and/or heath. They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (Webb & Shine 1998). The snake prefers sandstone outcrops that occur in vegetation that include *Corymbia gummifera, Eucalyptus sieberi*, *Corymbia eximia, E. punctata, E.piperita.* They utilise rock crevices for refuge in winter and tree hollows in summer but have a preference for west facing weathering sandstone for sheltering (Webb & Shine 1998). They prey predominantly on lizards. In summer they become arboreal, frequenting tree hollows where they often take small mammals. The Bar-sided Skink is often a diet preference during summer.	93 DPIE Atlas of NSW Wildlife (2020)	**Low-**Habitat unsuitable at subject site. Most records occur in reserves such as at Ku-ring0gai Chase National Park in the north-west and Garigal National Park in the south	No