Galston Aquatic and Leisure Centre - Flora and Fauna Assessment

Architects of Arcadia Pty Ltd

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Methodology
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	*Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CAA	Controlled Activity Approval
ELA	Eco Logical Australia
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
KFH	Key Fish Habitat
MNES	Matters of National Environmental Significance
NRAR	Natural Resources Access Regulator
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy
SSGF	Sydney Sandstone Gully Forest
TEC	Threatened Ecological Community

Executive Summary

Eco Logical Australia (ELA) was commissioned by Architects of Arcadia Pty Ltd to undertake a Flora and Fauna Assessment (FFA) as part of a development application (DA) for re-roofing of the Galston Aquatic and Leisure Centre and proposed Asset Protection Zone work at Hayes Park at 412 Galston Road, Galston (Lot 181 DP 752048) (the study area).

This document reports on the ecological values identified within the study area and considers both the direct and indirect impacts from the proposed re-roofing and Asset Protection Zone works in relation to current environmental planning legislation.

Two native vegetation communities were identified in the study area in poor to moderate condition

- Sydney Turpentine Ironbark Forest (STIF)
- Sydney Sandstone Gully Forest (SSGF)

No threatened flora or threatened flora habitat was identified within the proposed APZ. One threatened species *Epacris purpurascens* var *purpurascens* was identified to the west of the proposed APZ area.

A number of hollow-bearing trees and stags were recorded on site which provide suitable roosting habitat for threatened fauna species.

One threatened ecological community, Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion (Sydney Turpentine Ironbark Forest) was identified during the field survey to the east of the study area. This community is listed as an endangered ecological community under the *Biodiversity Conservation Act 2016* (BC Act).

No threatened flora or fauna species were recorded during the field survey or during targeted nocturnal surveys within the study area. However, potential foraging and roosting habitat was present within the study area for threatened microchiropteran bat species. A Test of Significance (5-part test) under the BC Act was undertaken for microchiropteran bats and concluded that the proposed works is unlikely to have a significant impact.

The triggers for the Biodiversity Offsets Scheme (BOS) were assessed for the proposed re-roofing and APZ works. It is understood that the proposed development will not:

- Exceed the area clearing threshold;
- Impact on land mapped on the Biodiversity Values Map; or
- Result in a significant impact to any threatened ecological communities or species listed under the BC Act.

Therefore, the BOS will not be triggered, and a Biodiversity Development Assessment Report (BDAR) is not required to be submitted with the DA.

The EPBC Act requires that if an action has, will have, or is likely to have a significant impact on MNES, it must be referred to the Australian Government Minister for the Environment for consideration. The

Minister may require further assessment and approval of an action, which in this instance is deemed a 'controlled action'.

Following consideration of the administrative guidelines for determining a significant impact under the EPBC Act, it is considered that the proposed works are unlikely to have a significant impact on any threatened flora and fauna species and therefore, a referral to the Commonwealth is not required.

Mitigation measures are provided to reduce impacts to threatened species and have been provided in Section 6.

1. Introduction

1.1 Purpose of this Report

Eco Logical Australia Pty Ltd (ELA) was engaged by Architects of Arcadia Pty Ltd to prepare this Flora and Fauna Assessment (FFA) for the proposed re-roofing and Asset Protection Zone (APZ) works at the Galston Aquatic and leisure Centre. ELA understands that this FFA will form part of a development application (DA) to Hornsby Shire Council and will be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This report describes impacts on native vegetation, threatened species, populations and communities listed under the NSW *Biodiversity Conservation Act* 2016 (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a result of the proposed re-roofing and APZ works. The impact assessment in this report is based on information gathered from data searches and field investigations. The report sets out the legislative context, methods used, impacts to the environment and recommendations to minimise these impacts.

1.2 Study area

The Galston Aquatic and Leisure Centre is located at Hayes Park, 412 Galston Road, Galston (Lot 181 DP 752048.) (the study area) (Figure 1). The Aquatic Centre is bound by Galston Road to the east, a private property to the north and Galston Recreation Reserve to the south and west. The study area is located within the Hornby Shire Council Local Government Area (LGA).

1.3 Proposed works

The proposed works include the re-roofing of the Aquatic Centre. These works are likely to require an Asset Protection Zone (APZ) to achieve a maximum Bushfire Attack Level (BAL) of BAL 40 in accordance with Australian Standard AS 3959-2009 Construction of Buildings in Bushfire Prone Areas. As such, vegetation removal of tree or shrub species or modification, such as the trimming or removal of branches will be required to comply with the maintenance of the APZ.

1.4 Key Terms

The following terminology has been used for this report and is consistent with the NSW Government Threatened Species Test of Significance Guidelines Office of Environment and Heritage (Now Department of Planning Industry and Environment) 2018:

- Study area - means the study area and any additional areas, which are likely to be affected by the proposal, either directly or indirectly. For the purpose of this report the study area includes everything within Lot 181 DP 752048.
- Proposal / proposed works - means vegetation clearance / modification (i.e. trimming of vegetation as described in Section 1.3.
- Locality - the same meaning as ascribed to local population of a species or local occurrence of an ecological community. For the purposes of this report, the locality is a 5km radius around the study area.

Local occurrence - the ecological community that occurs within the study area. However, the local occurrence may include adjacent areas if the ecological community on the study area forms part of a

larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.

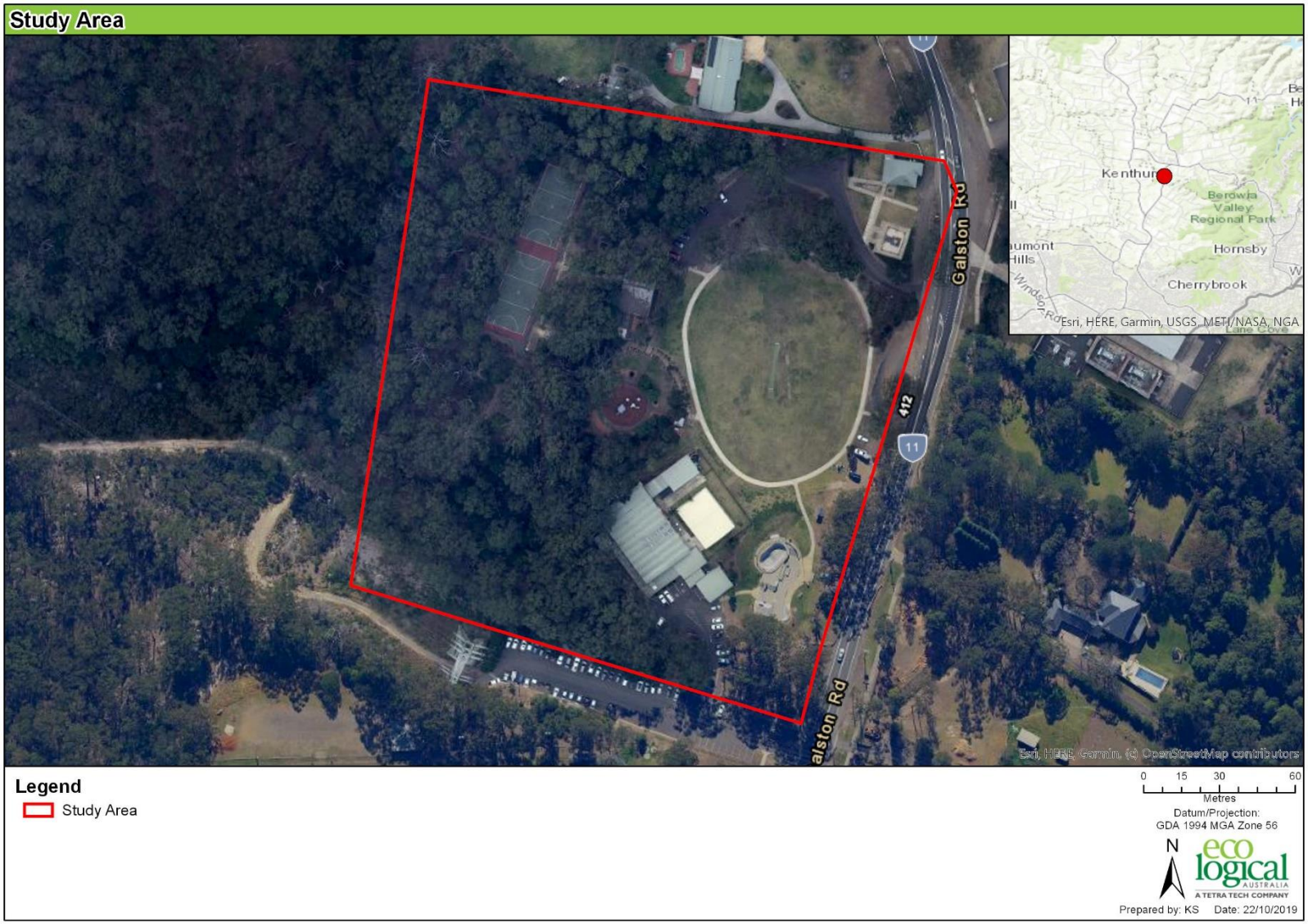

Figure 1: location of the study area

2. Legislative Context

Table 1: Legislation relevant to the proposal

Name	Relevance to the project	Section in this report
	Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act aims to protect Matters of National Environmental Significance (MNES) including wetlands of international importance, threatened species and communities and listed migratory species. An action that may or is likely to have a significant impact on MNES should be referred to the Commonwealth to determine whether it is a Controlled Action that requires approval from the Commonwealth.	Section 5.5 and Appendix B
	State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The proposed re-roofing of the aquatic centre and APZ works is to be assessed under Part 4 of the EP&A Act.	Section 5
Biodiversity Conservation Act 2016 (BC Act)	The overall purpose of the BC Act is to provide the legislative framework to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Among other things, the BC Act outlines the assessment requirements to determine whether a proposed development or activity (Part 4/Part 5 of the EP&A Act) is likely to significantly affect threatened species or ecological communities, or their habitats under section 7.3 of the Act, and whether the Biodiversity Offsets Scheme (BOS) will be triggered. If thresholds for the BOS and application of the Biodiversity Assessment Method (BAM) are triggered, a Biodiversity Development Assessment Report (BDAR) would be required. Triggers for the BOS and BAM are as follows: • Exceeding a native vegetation area clearance threshold relative to minimum lot size; or • Clearing of native vegetation identified on the NSW Government Biodiversity Values Map; or • A significant impact on a threatened species or ecological community (as assessed by a qualified ecologist). The BC Act also introduces the principle of Serious and Irreversible Impacts (SAII). SAII's are not a threshold trigger for the BOS however they must be addressed if a BDAR is required to be prepared. The BC Act requires a local council to reject a local development (under Part 4 of the EP&A Act) if an action is likely to have a serious and irreversible impact on biodiversity values. No threatened flora or fauna species were recorded within the study area during field survey or identified from past records. No threatened ecological communities were identified within the study area. This report assesses the likelihood of threatened species and concludes that the development is not likely to have a significant impact on threatened species or their habitats and that the BOS is unlikely to be triggered.	Section 5.4 and Appendix C
Biosecurity Act 2015	Under the Biosecurity Act, priority weeds have been identified for local government areas and assigned strategies to contain, remove or manage. Occupiers of land (this includes owners of land) have responsibility for taking appropriate action for priority weeds on the land they occupy.	Section 5.4

Name	Relevance to the project	Section in this report
	The study area contains nine weeds identified under the Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 developed under this Act.	
	Planning Instruments	
Hornsby Local Environmental Plan (HLEP) 2013	The study area is currently zoned RE1 – Public Recreation and SP2 Infrastructure under the Hornsby LEP. The study area is not mapped as Terrestrial Biodiversity, Environmentally Sensitive Land or on the Riparian Land and Watercourses Map under the Hornsby LEP 2013	N/A
Hornsby Development Control Plan (HDCP) 2013	The Hornsby Development Control Plan 2013 contains provisions relating to the maintenance of biodiversity values.	Section 5.6

3. Methods

3.1 Database Searches and Literature Reviews

The following information and databases were reviewed prior to the field survey:

- Previous vegetation mapping (OEH, 2013)
- BioNet/Wildlife Atlas database (Department of Industry Planning and Environment (DPIE 2019)
- NSW Government Biodiversity Values Map (accessed 22/10/2019)
- BioNet Vegetation Classification
- Aerial photographs
- EPBC Act Protected Matters Search Tool (DoEE 2019)
- Hornsby Local Environmental Plan (LEP) 2013

A search of BioNet (DPIE 2019) was performed on 5 August 2019 and a search of the EPBC Act Protected Matters Search Tool on 23 August 2019, using a radius of 5 km around the coordinates -33.65994 151.03623

3.2 Field Survey

3.2.1 Vegetation validation

The study area was surveyed by ELA ecologist Stacey Wilson on 2 October 2019. The vegetation mapping prepared by Office of Environment and Heritage (OEH) 2013 (now DPIE) was validated and changes to the vegetation mapping was undertaken as required and modified using hard copy maps. During the field survey habitat features, potential ecological constraints and opportunistic fauna sightings within the study area and study area were noted.

3.2.2 Targeted survey

Two ELA ecologists conducted a spotlighting survey on 2 October 2019. A range of call playback to elicit a call response from threatened species which have the potential to occur in the area were used. The vegetation surrounding the Aquatic centre and the vegetation in the adjoining bushland to the west was searched with spotlights in conjunction with call playbacks for 1 hour between 6:00 PM to 7:00 PM. A fauna camera was also set up facing a large hollow-bearing tree and left to record for the following 2 nights. An Anabat recording device was also set-up to record for 2 nights. However, due to equipment failure, the Anabat failed to record any data. In the absence of Anabat data a conservative approach has been taken and for the purposes of this report has assumed the presence of threatened microbats on-site.

3.3 Survey Limitations

3.3.1 Flora

The floristic survey undertaken provides a comprehensive but not definitive species list for the study area. The total species list of an area is usually much greater than can be detected in such a short time and it can be influenced by factors such as: size of the property, fire history, time since disturbance, life cycle stage/dormancy (particularly orchids and annuals), and presence of reproductive material (DEC 2004).

Nevertheless, the techniques used in this investigation are considered adequate and relevant to gather the data necessary to identify impacts of the proposal on threatened flora and their habitat; and the identified limitations are managed by objectively considering the potential for species to occur when suitable habitat, connectivity and local records occur, as per DEC (2004).

3.3.2 Fauna

The results of fauna surveys can be optimised by conducting investigations over a long period to compensate for the effect of unfavourable weather, seasonal changes, lifecycle stage and climatic variation (DEC 2004). Fauna survey results can also be improved by using a wide range of techniques at the right life cycle stage or conditions (e.g. call playback after heavy rain in summer for frogs), since some species are more likely to be detected by a particular method and time (DEC 2004).

However, all ecological surveys are subject to constraints that determine the amount of time allocated, the methods used, and the timing of the work. Thus, the results should be viewed in the light of these limitations.

The fauna detected during the survey period are a guide to the native fauna present but are by no means a definitive list of all the species occurring in the study area. Some species group specific methods (e.g. call detection of microchiropteran bats) were also not employed.

Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to identify impacts for the proposal; and the identified limitations are managed by objectively considering the potential for species to occur when suitable habitat, connectivity, and local records occur, as per DEC (2004).

4. Results

4.1 Database Searches and Literature Review

4.1.1 Threatened Ecological Communities, Flora, Fauna and Migratory Species

A review of the BioNet Atlas and EPBC Act protected matters search tool identified nine threatened ecological communities, 38 threatened flora and 65 threatened fauna (including migratory species) either known or considered likely to occur in the study area (Figure 2 and Figure 3).

Many of the threatened flora and fauna species excluded from further consideration are purely marine (e.g. fish and marine mammals) or estuarine to shoreline (e.g. waders) species that are not capable of utilising the site or study area, and thus are not likely to be affected by the proposed works. The likelihood of the remaining species to occur is reviewed in (Appendix B).

Threatened ecological communities either known or considered likely to occur within 5 km of the study area include:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
- Coastal Upland Swamps in the Sydney Basin Bioregion
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion

4.1.2 Vegetation Communities Mapping (OEH, 2016)

A review of the available vegetation mapping (OEH, 2013) indicated the following vegetation communities occur within proximity to the study area (Figure 4):

- PCT 1395: Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion
- PCT 1181: Smooth-barked Apple – Red Bloodwood – Sydney sandstone open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion
- PCT 1281: Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.

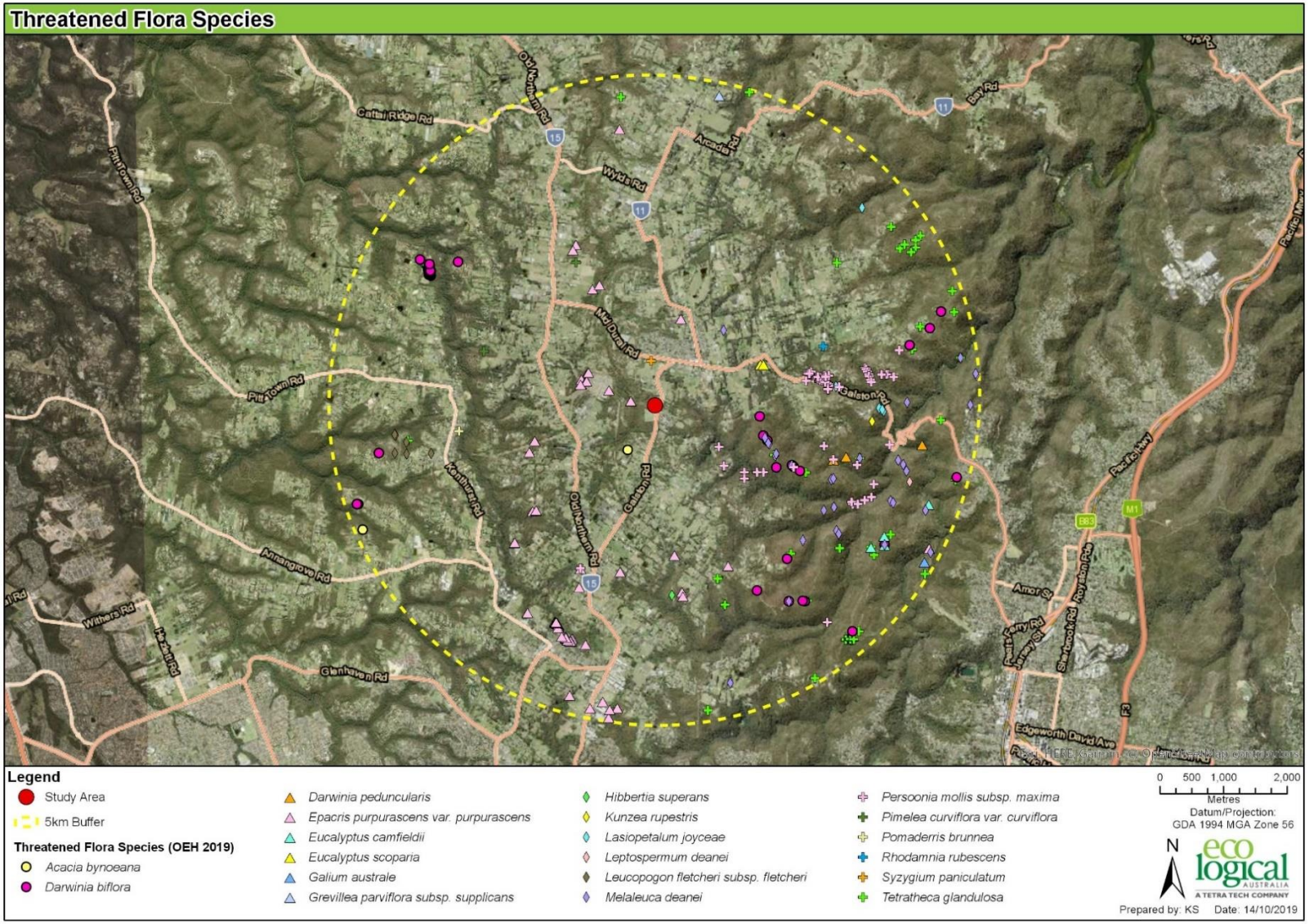

Figure 2: Threatened flora species recorded within 5 km of the study area

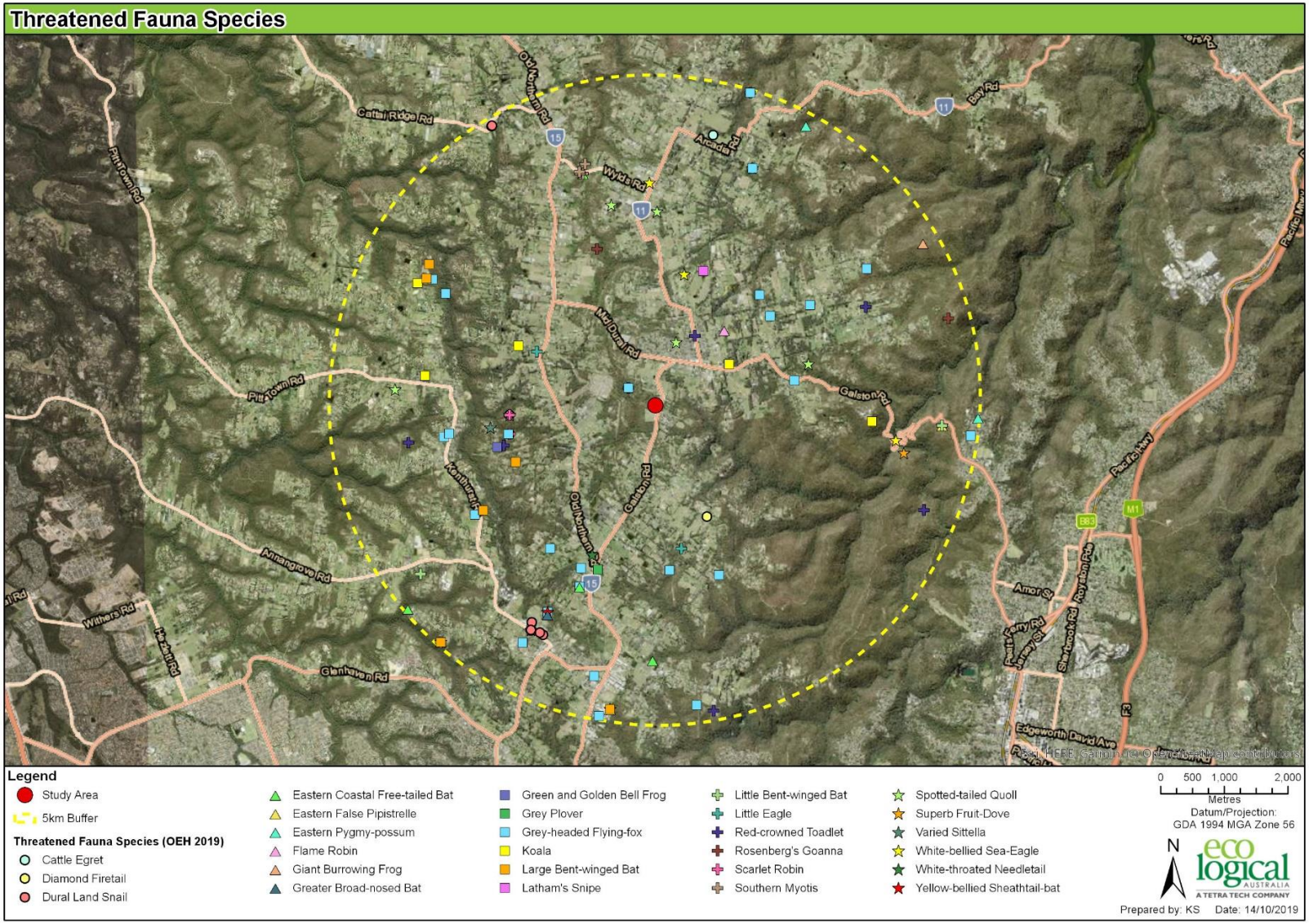

Figure 3: Threatened fauna species recorded within 5 km of the study area

Figure 4: Previous vegetation mapping of the study area and surrounding landscape (OEH, 2013)

4.2 Field Survey

4.2.1 Vegetation Validation

A map of validated vegetation within both the study area and study area is shown in Figure 5.

A description of the validated vegetation communities is described below, and a summary shown in Table 2, including Plant Community Types (PCTs) in accordance with the BioNet Vegetation Classification. A description of the vegetation within the study area is provided in the sections below.

Table 2: Vegetation communities within the study area

Vegetation community	Condition	PCT ID	PCT Name	BC Act	EPBC Act	Area (ha)
Sandstone Gully Forest	Poor – Moderate	1181	*Smooth-barked Apple – Red Bloodwood – Sydney sandstone open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*	Not listed	Not listed	2.1
	Poor – Moderate (Planted)	1181	*Smooth-barked Apple – Red Bloodwood – Sydney sandstone open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*	Not Listed	Not listed	0.19
				Total SSGF		**2.29**
Sydney Turpentine Ironbark Forest	Poor –	1281	*Turpentine – grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.*	CEEC	Not listed	0.24
	Poor– (Planted)	1281	*Turpentine – grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.*	CEEC	Not Listed	0.04
				Total STIF		**0.28**
Planted Native / Exotics	N/A	N/A	N/A	N/A	N/A	0.03
					Total	**2.6**

EEC = Critically Endangered Ecological Community

SYDNEY TURPENTINE IRONBARK FOREST (STIF) – POOR CONDITION

Sydney Turpentine Ironbark Forest (STIF) occurs in the south-east portion of the study area. STIF is listed under the NSW BC Act as a critically endangered ecological community. The STIF on site occurs along the southern boundary in a poor to moderate condition. There is a native canopy which includes *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), *Angophora costata* (Sydney Red Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Lophostemon confertus* (Brush Box), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus microcorys* (Tallowwood). A native midstorey is lacking in this community with only a few, likely planted *Acacia* spp. The understorey at the base of trees contains some native and exotic species. Species in the groundcover included *Dianella* sp., *Clematis aristata* (Old Man's Beard), *Microlaena stipoides* var. *stipoides, Dichondra repens* (Kidney Weed), *Eragrostis brownii* (Brown's Love Grass), *Ehrharta erecta*, (Panic Veldtgrass), *Trifolium repens* (White Clover), *Paspalum dilatatum*, *Plantago lanceolata* (Lamb's Tongues), *Cenchrus clandestinus* (Kikuyu Grass) and

Hardenbergia violacea (False Sarsaparilla). Surrounding the base of the tree trucks the groundcover becomes grassy and mowed with some bare patches of soil. A park bench and a cement walking track run through a portion of the STIF to the east and the entrance to the parking lot also intersects some of the STIF along the southern boundary. As STIF begins to grade into Sydney Sandstone Gully Forest (SGF) to the west *Pittosporum undulatum* (Sweet Pittosporum) is present in the midstorey with exotic *Privet* spp. This community also occurs in a planted condition with a similar assemblage of species, it exists as an isolated island in the middle of car parking /turning space to the east of the site.

STIF is also listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) as a critically endangered ecological community. The Turpentine-Ironbark Forest of the Sydney Basin Bioregion ecological community is limited to remnants that are relatively intact in condition, as outlined below.

- *The vegetation contains some characteristic components from all structural layers (tree canopy, small tree/shrub midstorey, and understorey).*
- *Tree canopy cover is greater than 10% and remnant size is greater than one hectare. These areas have the greatest conservation value and their high quality and size makes them most resilient to disturbance.*
- *However, remnants with tree canopy cover less than 10% are also included in the ecological community, if the fragments are greater than one hectare in size and occur in areas of native vegetation in excess of 5 hectares in area. These areas enhance the potential for connectivity and viability of the ecological community. They support native flora and fauna species by facilitating gene flow among remnants and buffering against disturbance.*

Under the above conditions the STIF identified within the study area does not meet the condition criteria for listing under the EPBC Act for the following reasons:

- The patch of STIF on-site is less than one hectare in size.

SYDNEY SANDSTONE GULLY FOREST (SSGF) – POOR – MODERATE CONDTION

Sydney Hinterland Transition Woodland occurred on the higher slopes and on the ridge within the site. The majority of this community within the subject site had been cleared and existed in an under-scrubbed form, or as open areas of exotic grassland with scattered canopy species. The canopy was dominated by *Eucalyptus pilularis* (Blackbutt) *Angophora costata, Syncarpia glomulifera* (Turpentine), (Sydney Red Gum), and *Eucalyptus resinifera* (Red Mahogany) and occurring less frequently Eucalyptus *piperita,* Sydney Peppermint and *Eucalyptus punctata* (Grey Gum). The mid-storey contained little diversity, with the dominant species were native *Pittosporum undulatum* and exotic *Privet* spp. The ground layer was dominated by exotic grasses and some woody weeds, but also contained a variety of native forbs and grasses including *Oplismenus aemulus, Pratia purpurascens (White Root), Lomandra* spp. (Matrush), *Paspalum dilatatum, Dianella revoluta* (Blue-flax Lily). *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal Creeper) and *Sida rhombifolia.* Intact form of this vegetation community exists in the western portion of the study area.

This community also occurred in a landscaped condition to the north of the site with a similar assemblage of species and also included *Imperata cylindrica* var. *major* (Blady Grass), *Banksia spinulosa* (Hairpin Banksia), *Allocasuarina littoralis* (Black Sheoak), *Entolasia marginate* (Bordered panic) and

some planted *Eucalyptus scoparia (*Wallangarra White Gum) which is listed as a threatened species under the BC Act.

PLANTED NATIVE / EXOTIC

Planted native and exotic vegetation surrounds the Aquatic Centre and includes *Howea forsteriana* (Kentia Palm), Melia *azedarach* (White Cedar), *Callistemon viminalis* (Weeping Bottlebrush) with a mown, exotic understorey.

4.2.2 Threatened ecological communities

One threatened ecological community, Sydney Turpentine Ironbark Forest (STIF) (PCT 1281) was present within the study area and was mapped in two conditions (poor to moderate) and (planted). The majority of vegetation within the study area is managed vegetation, largely consisting of cleared and disturbed vegetation with some native groundcovers and opportunistic weeds.

Figure 5: ELA validated vegetation of the study area

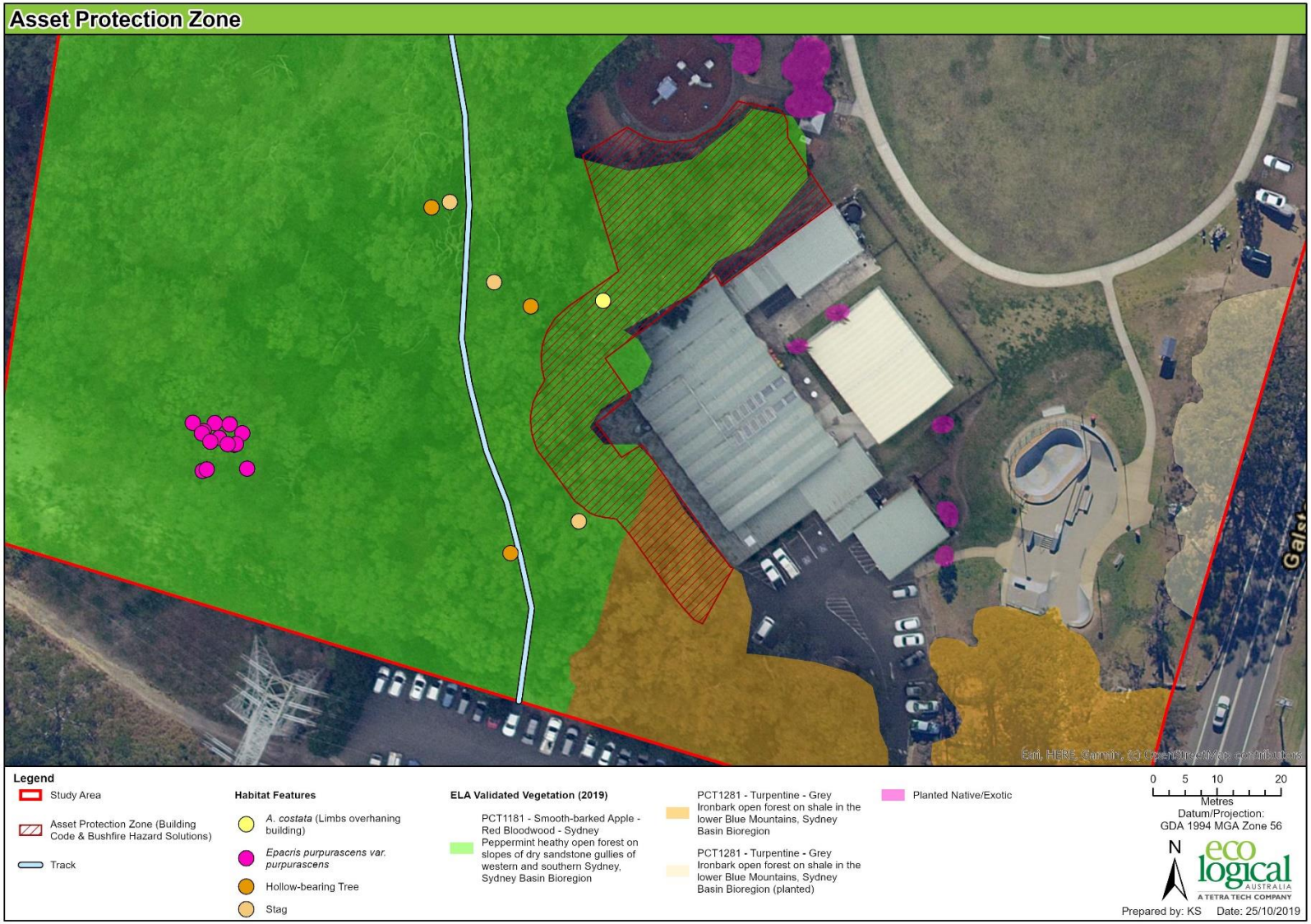

Figure 6: Proposed impact area of the Asset protection Zone

4.2.3 Flora species

The field survey identified 63 flora species, comprising 37 native species and 26 exotic species. A full list of flora species recorded within the study area is available in Appendix A.

4.2.4 Threatened flora species

No threatened flora species were recorded within the impact area. Additionally, no habitat was identified for threatened flora species within the impact area.

4.2.5 Priority weeds

Two Priority Weeds listed under the NSW *Biosecurity Act 2015*, and nine weeds of regional concern outlined in the Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 (LLS 2017) were identified in the study area, which includes two Weeds of National Significance (WoNS). The priority weeds present, their management class and their status as a WoNS is provided in (Table 3).

Table 3: Priority weeds and WoNS

Scientific Name	Common Name	WoNS	Priority Weed Objective or Asset at Risk
State Priority Weeds			
Lantana camara	Lantana	Yes	Asset protection[1]
Asparagus asparagoides	Bridal Creeper	Yes	Asset protection[1]
Weeds of Regional Concern			
Araujia sericifera	Moth Vine	No	Environment[2]
Cinnamomum camphora	*Camphor Laurel*	No	Environment, Agriculture, Human Health[2]
Cenchrus clandestinus	Kikuyu	No	Environment[2]
Eragrostis curvula	African Lovegrass	No	Environment[2]
Ligustrum lucidum	Broad-leaf Privet	No	Environment, Human Health[2]
Ligustrum sinense	Small-leaf Privet	No	Environment, Human Health[2]
Olea europaea subsp. *cuspidata*	African Olive	No	Eradication[2]
Phoenix canariensis	Canary Island Date Palm	No	Environment[2]
Tradescantia fluminensis	Trad	No	Environment[2]

[1] Mandatory measure (Whole of NSW)

[2] Regional Strategic Response

4.3 Fauna species and habitat

4.3.1 Targeted threatened fauna surveys and threatened fauna habitat

During the targeted nocturnal survey no threatened fauna listed under the BC or EPBC Act was recorded within the study area. There were no results of any threatened or non-threatened fauna collected from the camera.

A list of threatened fauna species known to occur within a 5 km radius of the study area has been collated Appendix B.

Vegetation within the study area provides suitable habitat for a number of common peri-urban species and threatened fauna species. The habitat features relevant to each fauna group are identified in the table below.

Table 4: Habitat features and associated fauna groups (guilds) recorded within the study area

Habitat Features	Guild	Presence in study area
Remnant vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	Present
Winter flowering species	Winter migratory birds, arboreal mammals and megachiropteran bats (fruit bats)	Limited
Hollow-bearing trees (HBT)	Birds and arboreal mammals (gliders and microbats)	Present
Stags	Birds, particularly birds of prey, reptiles, amphibians, micro bats	Present in study area
Leaf Litter	Reptiles, amphibians, invertebrates	Limited
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Present
Drainage lines and Dams	Amphibians, reptiles, water birds and microbats	Limited
Rocks/ Rocky Outcrops	Reptiles, invertebrates, terrestrial mammals	Present
Vegetative corridor	Birds, reptiles, arboreal and small mammals	Vegetation within the impact area adjoins remnant, native vegetation within the west portion of the study area.
Mistletoe	Birds and arboreal mammals	Not recorded
Native/ Exotic grassland	Migratory wetland birds (Egrets), predator bird species (Little Eagle) and microbats	Present, includes Hayes Oval. Managed as a cricket pitch

HOLLOW BEARING TREES

A total of 6 hollow-bearing trees and 3 stags were recorded within the study area. The locations of HBTs and stags within the study area is provided in (Figure 6). The HBTs contained several small pipe hollows and a medium-sized hollow that could potentially provide habitat for a number of threatened fauna.

BIRDS

Vegetation that supports a good mix of ground, shrub and canopy species are favoured by a range of small bird species. Shrubs within the proposed APZ include a mix of both native and exotic species including *Pittosporum undulatum* and *Privet* spp.

Remnant trees typically provide foraging, roosting and perching habitat for a number of larger bird species. Stags and HBT's provide roosting habitat for hollow-dependant bird species and are often in limited supply in fragmented habitats. As mentioned above, both remnant trees and HBT's were present within the study area.

MAMMALS

There is some habitat available for native terrestrial and arboreal mammals within the study area. Possum and glider species rely on an abundance of eucalypt species for foraging and require HBT for roosting. During the nocturnal survey, six *Trichosurus vulpecula* (Common Brushtail possum) were observed. HBT's with variable size entrances are present within the study area and within the adjoining native vegetation and provide suitable habitat for a variety of arboreal fauna species. One medium-sized HBT that could support these species was identified within the proposed APZ.

BATS

Small hollows may provide roosting habitats for microchiropteran bat species (microbats), including a number of threatened species. Southern Myotis are also known to occasionally roost in hollow-bearing trees outside of the breeding season. Roosting habitat for threatened and non-threatened cave roosting species including: Large-eared Pied Bat, Southern Myotis and Eastern Bentwing-bat have not been recorded within the study area. However, all species have the potential to utilise the study area as foraging habitat.

Although there are a number of threatened microbat species recorded within 5 km of the study area. Habitat for these species is likely to occur outside of the impact area and in the wider locality.

Additionally, the remnant trees across the study area may attract megachiropteran (fruit bats) into the study area such as the Grey-headed Flying-fox.

The nearest Grey-headed Flying fox to the study area is the Nationally Important camp at the Ku-ring-gai Flying-fox Reserve, located within 15 km of the study area. GHFF are likely to use the site intermittently to forage.

AMPHIBIANS

There were no standing or flowing water bodies recorded within the impact area or across the study area. There is one drainage line present that runs downslope in the south of the study area, but this was dry at the time of survey and unlikely be habitat for amphibians.

REPTILES

Fallen logs were recorded within the study area and provide suitable basking habitat for a number of reptile species.

INVERTEBRATES

Dural Land Snail has been recorded within a 5 km radius of the study area. Dural Land Snails favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris (DPIE, 2019). Marginal habitat for Dural Land Snail exists within the proposed APZ area, with low coverage of rocks, some defoliating bark and leaf litter around the base of some larger remnant trees. More suitable habitat for this species was identified within the adjoining bushland to the west of the proposed APZ which contained more rocks and higher percentage of leaf litter cover.

4.3.2 Site Connectivity

Local corridors provide connections between remnant patches of habitat and landscape features. Due to their relatively small area and width (they may be <50 m), these corridors are subject to edge effects (Scotts 2002, Lindenmayer and Fisher 2006). Habitat links are evaluated in this report as links from habitat on-site directly to similar habitat on adjacent land. These would be used by fauna, which depend solely or at least partially on the site for all of their lifecycle requirements, and/or dispersal (Lindenmayer and Fisher 2006).

Undisturbed vegetation is present to the west of the proposed impact area, this vegetation extends past the boundaries of the study area and into the Galston Recreational Reserve. Aerial imagery suggests that that this vegetation is further connected to vegetation along the Calah Creek riparian corridor in the wider locality.

5. Impact Assessment

5.1 Summary of impacts

Both direct and indirect impacts for the immediate clearing for the APZ and the on-going maintenance of the APZ in the long term have been considered in the impact assessment below. The works will result in the removal of 0.15 ha of vegetation from the study area. The potential impact of the proposal to selected threatened species and communities listed under the BC Act and EPBC has been assessed. Requirements under the BC Act for triggering the Biodiversity Offsets Scheme (BOS) and application of the Biodiversity Assessment Method (BAM) have also been addressed.

5.2 Direct impacts

Direct impacts are those impacts that directly affect habitat and individuals. Direct impacts considered for this assessment are vegetation and habitat removal. The proposed works is likely to result in the removal of native vegetation.

5.2.1 Removal of native vegetation

The proposed Asset Protection Zone works will result in the removal of both native and exotic vegetation. A total of 0.15 ha of vegetation will be impacted for the APZ. This includes 0.04 ha of Sydney Turpentine Ironbark Forest and 0.11 ha of Sydney Sandstone Gully Forest (Table 5).

Table 5: Direct impacts

PCT ID	PCT Name	Vegetation Community	Condition	BC Act	EPBC Act	Area impacted (ha)	Local occurrence (ha)	Removal of local occurrence[b] (%)
1281	*Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion*	Sydney Turpentine Ironbark Forest	Poor	CEEC	Not Listed	0.04	611.9	6.53
1181	*Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*	Sydney Sandstone Gully Forest	Poor - Moderate	Not Listed	Not Listed	0.11	-	-
N/A	N/A	Cleared / Exotic		N/A	N/A	-	-	-
					Total	**0.15**	**611.9**	**6.53**

a) CEEC = Critically Endangered Ecological Community

b) local occurrence has been determined by a 1km buffer to the subject site and includes those areas of vegetation where the exchange of genetic material is possible by the movement of highly mobile vectors such as birds and bats.

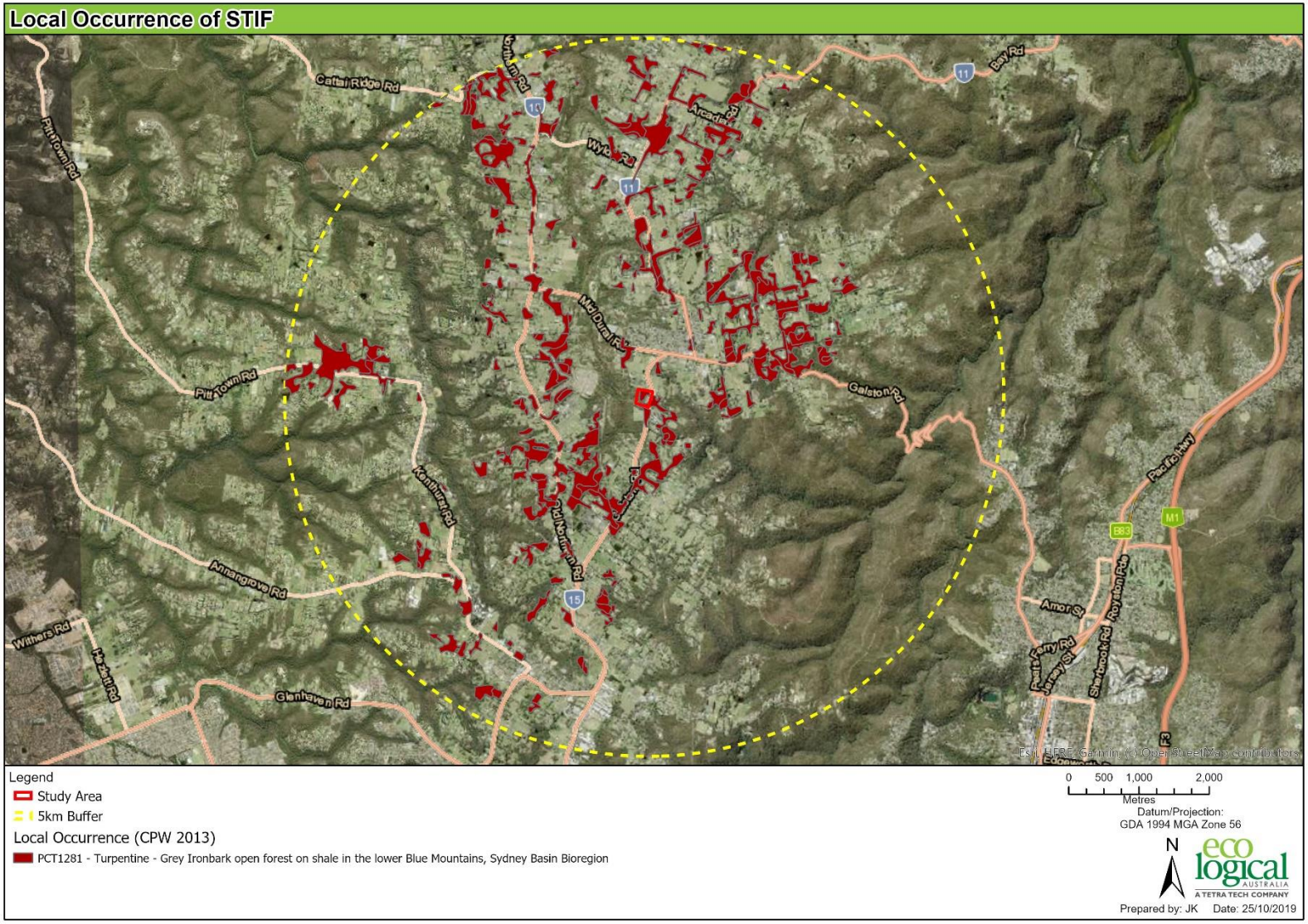

Figure 7: local occurrence of Sydney Turpentine Ironbark Forest within 5 km radius of the study area

5.3 Indirect Impacts

Indirect impacts are those impacts that do not directly affect habitat and individuals but that have the potential to interfere through indirect action. Indirect impacts considered for this assessment is weed invasion.

An assessment of indirect impacts has been included as part the impact assessment. Potential indirect impacts may include:

- possible increase in weeds following Asset Protection Zone works due to increase in light and space as native species are removed.

It is noted that the existing environment is already affected by weed infestation. The proposed APZ works is unlikely to significantly exacerbate impacts associated with weeds. Weeds will also be removed as part of the APZ works. Priority and regional weeds listed in Section 4.2.5 should be managed in accordance with the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS 2017).

5.4 NSW *Biodiversity Conservation Act 2016* (BC Act)

In November 2016 the NSW parliament passed the BC Act, that replaced the *Threatened Species Conservation Act 1995*, and which took effect on 25 August 2017. Among other things, the BC Act introduces new requirements for biodiversity assessment (Biodiversity Assessment Methodology (BAM)) and requires proponents to offset certain biodiversity impacts through the purchase and retirement of biodiversity credits known as the Biodiversity Offset Scheme (BOS). For a local development under Part 4 of the *Environmental Planning and Assessment Act 1979*, the BOS and the BAM may be triggered by the following means:

- Exceeding the area of clearing threshold associated with the minimum lot size for the property (Table 6)
- The impacts occur on an area mapped on the NSW Government Biodiversity Values Map.

Table 6: Area clearing threshold

Minimum lot size associated with the property	Threshold for clearing native vegetation, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

Even if the development site does not satisfy either of these criteria, if a ‘test of significance' under section 7.3 of the BC Act determines a significant impact on threatened species, the BOS will be triggered and a Biodiversity Development Assessment Report (BDAR) must be prepared. If none of these triggers are met, a Flora and Fauna Assessment can be prepared as was the case in the previous application.

5.4.1 Area clearing threshold

The threshold for clearing, above which the BAM and offsets scheme apply, for a property with a minimum lot size in the LEP of 1 ha to less than 40 ha is 0.5 ha or more. The proposed Asset protection Zone works will remove 0.15 ha of native vegetation; therefore, it does not meet the threshold trigger for the Biodiversity Offset Scheme under s7.3 of the BC Act.

5.4.2 Biodiversity Values Map

The BV Map identifies land considered to have high biodiversity value as defined by the Biodiversity Conservation Regulation 2017. The study area does not contain any areas mapped as high biodiversity value on the BV Map (as of 3 September 2019).

5.4.3 Key Threatening Processes

The Key Threatening Processes (KTPs) listed under the BC Act and / or EPBC Act that are likely to be relevant to the proposed works include:

- clearing of native vegetation (BC Act) / land clearance (EPBC Act)
- invasion of native plant communities by exotic perennial grasses (BC Act)

5.4.4 Test of Significance

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where 'Matters of National Environmental Significance' (MNES) may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a MNES is defined as a "controlled action", and requires approval from the Commonwealth Department of the Environment and Energy (DotEE) which is responsible for administering the EPBC Act. One nationally threatened fauna species, *Pteropus poliocephalus* (Grey-headed Flying-fox), is likely to utilise foraging resources within the study area and there is a known maternity camp within 300 m of the proposed works. A Significance Assessment was undertaken for the Grey-headed Flying Fox and it was determined that the proposed works are unlikely to have a significant impact on this species.

5.4.4.1 Endangered Ecological Communities

One endangered ecological community, Sydney Turpentine Ironbark Forest (STIF), was present within the study area. However, STIF is outside of the impact area. Hence no further assessment is required under Section 7.3 of the BC Act for endangered ecological communities.

5.4.4.2 Threatened Flora

No threatened flora species were recorded within the study area during the survey. Furthermore, no suitable habitat was considered to be present for any threatened flora species due to the high level of vegetation modification, disturbance and weed infestation within the study area. Hence no further assessment is required under Section 7.3 of the BC Act for threatened flora species.

5.4.4.3 Threatened fauna

No threatened fauna species were recorded during field surveys. However, habitat for threatened fauna is present within the study area and within the proposed APZ. Therefore, a Test of Significance under the BC and EPBC Act was undertaken. These assessments are provided in Appendix C.

5.5 *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a MNES" is defined as a controlled action and requires approval from the Commonwealth Department of the Environment and Energy (DotEE) which is responsible for administering the EPBC Act.

No threatened ecological communities, flora or fauna species listed under the EPBC Act were recorded during the field surveys and based on habitat assessments are unlikely to occur within the study area or, are unlikely to be adversely impacted by the proposal (Appendix B). It is noted that some threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, these species are highly mobile and the amount of habitat to be impacted is negligible in comparison to the availability of similar habitat in the adjacent landscape and locality.

Therefore, no Commonwealth significant impact assessments were considered to be required for threatened ecological communities, flora or fauna species.

5.6 Hornsby Development Control Plan (HDCP) 2013

The study site is also subjected to The Hills Development Control Plan, Part B Section 3.32, which contains considerations for biodiversity (Table 7).

Table 7: Hornsby Development Control Plan 2013 relevant biodiversity clauses

Clause number	Relevant content of clause
1C1.1 Biodiversity	*Desired outcomes:* *(a) Development that provides for the conservation of biodiversity including threatened species and populations, endangered ecological communities, remnant indigenous trees, regionally and locally significant terrestrial and aquatic vegetation.* *(b) Development that maintains habitat for native wildlife and wildlife corridors to provide for the movement of fauna species.* *Prescriptive measures* *(a) Development should seek to:* • *avoid potential adverse impact on biodiversity,* • *if that impact cannot be avoided, minimise that impact, or* • *if the impact cannot be minimised, to mitigate the impact.* *(b) A flora and fauna assessment is required for development that may impact on:* • *land mapped as Biodiversity on the HLEP Terrestrial Biodiversity Map, or* • *native vegetation which is habitat for species listed in Schedule 1, 1A or 2 of the Threatened Species Conservation Act 1995** • *(c) Development should avoid the fragmentation of existing native vegetation.* *(d) Development should seek to retain unique environmental features of the site including:* • *rock outcrops,* • *wetlands and the like,* • *watercourses, drainage lines and riparian land,* • *groups of significant trees and vegetation, and* • *mature hollow trees and other fauna habitat features on the site.*

Clause number	Relevant content of clause
	(e) Development should incorporate and maintain a buffer zone to significant flora and fauna. Development should not include buildings, structures and earthworks within the required buffer zone prescribed in Table 1C.1.1(a)
	(f) Development should incorporate and maintain a buffer zone to significant flora and fauna. Development should not include buildings, structures and earthworks within the required buffer zone prescribed in Table 1C.1.1(a)

*Replaced by the Biodiversity Conservation (BC) Act 2016

With regard to clause 1C1.1 the proposed APZ area is not mapped as Biodiversity on the Terrestrial Biodiversity Map. However, the clearing of native vegetation will be required, as well as some management of native vegetation to comply with APZ requirements. The proposed APZ is consistent with clause 1C1.1 as:

- The majority of vegetation within the study area is not being cleared
- The removal of mature, hollow-bearing trees has been avoided
- Only a small (0.04) ha area of poor condition STIF will be removed as part of the proposed works
- Asset protection zones do not require the full clearing of existing ecological values or native vegetation.
- A Green Offset Policy will be applied at a 5:1 ratio through the implementation of a Vegetation Management Plan to enhance the retained native vegetation within the study area. This area should exclude the APZ and include the surrounding bushland within the reserve. The VMP should be implemented in a staged manner over 5 years.

6. Mitigation Measures

The following measures are designed to minimise potential impacts from works associated with clearing native vegetation for the establishment of the APZ. The measures should be considered during the site planning phase and should form part of the development consent, where possible.

Recommended measures include:

- A Vegetation Management Plan is to be prepared for the vegetation outside of the APZ with the following objectives:
  - Promote natural regeneration and retention of existing stands of native vegetation
  - Ensure vegetation is managed for long term conservation outcomes, including restoration, monitoring and protection of *Epacris purpurascens* var. *purpurascens* habitat.
  - Incorporate weed management actions to protect existing ecological values on and off-site
  - Incorporate pest management actions.
  - Establishment of clearly defined areas, such as the works area and any 'no-go' areas within/adjacent to work site boundaries that are not to be in any way disturbed or damaged by the works (e.g. native vegetation to the east of the site).
  - The Vegetation Management Plan should ensure vegetation is managed for long term conservation outcomes and is therefore generally consistent with clause C1C.1
- Where possible retain all hollow-bearing trees within the APZ. If Hollow-bearing trees cannot be retained replace the hollows at a 1:1 ratio with nest boxes within the non-impacted vegetation to the west of the study area.
- When choosing plants for removal for the APZ the following rules under the *NSW Rural Fire Service – Standards for asset protection zones* should apply:
  - *remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at www.agric.nsw.gov.au/noxweed/;*
  - *remove more flammable species such as those with rough, flaky or stringy bark; and*
  - *remove or thin understorey plants, trees and shrubs less than three metres in height*

7. Conclusion

Eco Logical Australia (ELA) was contracted by Architects of Arcadia c/o Hornsby Council to prepare this FFA to support a Development Application for the re-roofing of the Galston Aquatic and Leisure Centre at Hayes Park at 412 Galston Road Galston (Lot 181 DP 752048).

Field survey confirmed that one threatened ecological community, Sydney Turpentine Ironbark Forest listed under the BC Act was present within the study area.

One threatened flora species *Epacris purpurascens* var. *purpurascens* was recorded to the west of the impact area. However, no individuals were recorded within the proposed APZ area and it was not considered potential habitat for this threatened species due to the high level of weed invasion. As such, a significant impact under Section 7.3 of the BC Act for threatened flora was considered unnecessary and a Test of Significance was not undertaken.

No other threatened flora or fauna were observed during the field survey. However, the site contains suitable habitat resources (foraging, roosting and/or nesting) for a number of threatened fauna and a number of hollow-bearing trees (HBTs) were present within the vegetation communities.

As a worst-case scenario up to 0.04 ha Sydney Turpentine Ironbark Forest and 0.11 ha of Sydney Sandstone Gully Forest will be removed/modified for the maintenance of the APZ. These impacts were assessed against the triggers for the Biodiversity Offset Scheme (BOS), as part of the BC Act. The impacts were not considered to trigger the BOS, and therefore assessment using the Biodiversity Assessment Methodology (BAM) and a BDAR is not required.

Taking a conservative approach, A Test of Significance were undertaken for the threatened ecological communities and fauna species listed under the BC Act (Sydney Turpentine Ironbark Forest and Microchiropteran bats), which may be impacted by the works. The assessment is provided in Appendix C and concluded that it is unlikely that the proposal would significantly impact any ecological values listed under the BC Act.

Recommendations for the conservation and management of biodiversity values of the study area are:

- inclusion of a condition of consent to maintain all hollow-bearing trees within the APZ in the development approval.
- development and implementation of a Vegetation Management Plan.

8. References

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Office of Environmental and Heritage (OEH) 2019b. Threatened Species Profiles http://www.threatenedspecies.environment.nsw.gov.au/index.aspx.

Standards Australia (2009) *Construction of buildings in bushfire-prone areas (including Amendments 1 – 3)*, AS 3959-2009. SAI Global, Sydney.

Appendix A : Flora and fauna species list

Table 8: List of flora species recorded within the study area

Scientific Name	Common Name	Exotic (*)	Priority Weed (PW / WoNs)
Acacia decurrens	Black Wattle		
Acacia linifolia	White Wattle		
Allocasuarina littoralis	Black Sheoak		
Allocasuarina torulosa	Forest Oak		
Angophora costata	Smooth-barked Apple		
Araujia sericifera	Moth Vine	*	PW
Aristida ramosa	Purple Wiregrass		
Asparagus asparagoides	Bridal Creeper	*	PW, WONS
Banksia spinulosa	Hairpin Banksia		
Bidens pilosa	Cobbler's Pegs	*	
Bossiaea obcordata	Spiny Bossiaea		
Bromus sp.		*	
Casuarina glauca	Swamp Oak		
Cenchrus clandestinus	Kikuyu	*	
Cinnamomum camphora	Camphor Laurel	*	
Clematis aristata	Old Man's Beard		
Commelina cyanea	Scurvy Weed		
Conyza bonariensis	Flax-leaf Fleabane	*	
Cyathochaeta diandra			
Cyperus eragrostis	Umbrella Sedge	*	
Dianella sp.			
Dichondra repens	Kidney Weed		
Doryanthes excelsa	Gymea Lily		
Ehrharta erecta	Vasey Grass	*	
Einadia sp.			
Entolasia marginata	Bordered Panic		
Eragrostis brownii	Brown's Love Grass		
Eragrostis curvula	African Lovegrass	*	
Eucalyptus fibrosa	Broad-leaved Ironbark		
Eucalyptus microcorys	Tallowwood		
Eucalyptus pilularis	Blackbutt		
Eucalyptus piperita	Sydney Peppermint		
Eucalyptus punctata	Grey Gum		
Eucalyptus scoparia	Wallangarra White Gum		
Goodenia hederaceae	Forest Goodenia		
Hardenbergia violacea	False Sarsaparilla		
Hydrocotyle bonariensis	Large-leaf Pennywort	*	
Hypochaeris radicata	Flatweed	*	
Imperata cylindrica var. *major*	Blady Grass		
Kunzea ambigua	Tick Bush		
Lantana camara	Lantana	*	PW, WONS
Ligustrum lucidum	Broad-leaf Privet	*	

Scientific Name	Common Name	Exotic (*)	Priority Weed (PW / WoNs)
Ligustrum sinense	Small-leaf Privet	*	
Lomandra longifolia	Spiny-headed Mat-rush		
Lomandra obliqua	Fish Bones		
Lophostemon confertus	Brush Box		
Medicago sativa	Lucerne	*	
Microlaena stipoides	Weeping Meadow Grass		
Olea europaea subsp. *cuspidata*	African Olive	*	PW
Oplismenus aemulus	Australian Basket Grass		
Paspalum dilatatum		*	
Phoenix canariensis	Canary Island Date Palm	*	
Pinus sp.		*	
Pittosporum undulatum	Sweet Pittosporum		
Plantago lanceolata	Plantain	*	
Pratia purpurascens	White Root		
Pteridium esculentum	Bracken Fern		
Sida rhombifolia	Paddy's Lucerne	*	
Sonchus oleraceus	Common Sowthistle	*	
Syncarpia glomulifera	Turpentine		
Tradescantia fluminensis	Trad	*	
Trifolium repens	White Clover	*	
Verbena bonariensis	Purple Tops	*	

Table 9: List of fauna species identified during field survey

Fauna Group	Scientific name	Common Name	Observation Type	Exotic (*)
Birds	*Corvus coronoides*	Australian Raven	Observed	*
	Manorina melanocephala	Noisy Minor	Observed	
	Platycercus elegans	Crimson Rosella	Observed	*
Mammals	*Trichosurus vulpecula*	Common Brushtail Possum	Observed	
Reptiles	*Intellagama lesueurii*	Australian Water Dragon	Observed	

Appendix B : Likelihood of occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species or ecological communities that were recorded within the study area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the study area, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Profiles.

Table 10: Likelihood of occurrence for threatened ecological communities

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	V / CEEC	EEC	Sydney Basin Bioregion, mostly in the Cumberland IBRA sub-region, with small occurrences in the Sydney Cataract, Wollemi and Burragorang sub-regions. It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain with other known occurrences near Holsworthy, Kemps Creek and Longneck Lagoon. Occurs primarily on Tertiary sands and gravels of the Hawkesbury-Nepean river system. At Agnes Banks it primarily occurs on aeolian (wind-blown) sands overlying Tertiary alluvium. Found on flat or gently undulating terrain in rain shadow areas typically receiving 700–900 mm annual rainfall. The ecological community occurs primarily at low elevations up to 80 m above sea level, including old ridges, dunes and terraces.	No – not identified within the study area	No
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community	EEC	EEC	This ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Typically, these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	No – not identified within the study area	No
Coastal Upland Swamps in the Sydney Basin Bioregion	EEC	EEC	Occur primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture. Generally associated with acidic soils.	No – not identified within the study area	No
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	EEC	CEEC	Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales.	No – not identified within the study area	No

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	EEC	CEEC	Illawarra coastal plain and escarpment foothills, rarely extending onto the upper escarpment slopes. Recorded from the local government areas of Wollongong, Shellharbour, Shoalhaven and Kiama. Mainly occurs between Albion Park and Gerringong, but outlying occurrences extend south to the Shoalhaven River and west into the Kangaroo Valley.	No – not identified within the study area	No
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	CE	CE	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. It typically occurs in moderately wet sites, with an annual rainfall of 800-1100mm per year, and on clay soils derived from Wianamatta shale. The tree canopy is dominated by Turpentine and a variety of eucalypt species. Its distribution is mainly on the Cumberland Plain of the Sydney region. Was not recorded during the site inspection.	No – not identified within the study area	No
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	CEEC	CEEC	Occurs close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus. Open forest, with dominant canopy trees including *Syncarpia glomulifera* (Turpentine), *Eucalyptus punctata* (Grey Gum), *E. paniculata* (Grey Ironbark) and *E. eugenioides* (Thin-leaved Stringybark). In areas of high rainfall (over 1050 mm per annum) *E. saligna* (Sydney Blue Gum) is more dominant. The shrub stratum is usually sparse and may contain mesic species such as *Pittosporum undulatum* (Sweet Pittosporum) and *Polyscias sambucifolia* (Elderberry Panax).	Yes. This ecological community was identified within the study area.	No. This ecological community will not be impacted by the proposed works.

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Western Sydney Dry Rainforest and Moist Woodland on Shale	EEC	CEEC	Typically, a low closed forest, slightly more open in the moist woodland form, with emergent trees up to 25 m high and a lower tree layer. In sheltered gullies and on lower slopes the canopy layer is typically dominated by *Melaleuca styphelioides* (prickly-leaved paperbark). Other diagnostic tree species include *Acacia implexa* (hickory wattle), *Alectryon subcinereus* (native quince), *Brachychiton populneus* (kurrajong), *Corymbia maculata* (spotted gum), *Melicope micrococca* (white euodia) and *Streblus pendulinus* (whalebone tree). Generally, on upper slopes to undulating terrain, or at more disturbed sites, the ecological community exhibits its moist woodland form with the canopy dominated by *E. moluccana*, *E. tereticornis*, *E. crebra* and/or *Corymbia maculata*. Characteristic shrub species include *Breynia oblongifolia* (false coffee bush), C*lerodendrum tomentosum* (hairy clerodendrum) and *Notelaea longifolia f. longifolia* (large mock-olive). Vines and other climber species are typically common. The ground layer is variable and generally sparse with a diverse mix of forbs, ferns and shade-tolerant grasses.	No – not identified in the study area	No

Table 11: Likelihood of occurrence for threatened flora species within 5 km of the study area

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Acacia bynoeana	Bynoe's Wattle	E1	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	3	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No.
Acacia pubescens	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	3	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Allocasuarina glareicola	-	E1	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Asterolasia elegans	-	E1	E	*Asterolasia elegans* is restricted to a few localities on the NSW Central Coast north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs. It is found in sheltered forests on mid- to lower slopes and valleys, in or adjacent to gullies.	0	Unlikely – no records within a 5 km radius of the study area and this species was not	No

						recorded during the field survey.	
Caladenia tessellata	Thick-lipped Spider-orchid	E	V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Callistemon linearifolius	Netted Bottle Brush	V	-	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges.	1	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	*Cryptostylis hunteriana* is known from a range of vegetation communities including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); where it appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C.*	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No

				subulata) and the Tartan Tongue Orchid (*C. erecta*). Occurs in Coastal Plains			
Cynanchum elegans	White-flowered Wax Plant	E1	E	*Asterolasia elegans* is restricted to a few localities on the NSW Central Coast north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs. It is found in sheltered forests on mid- to lower slopes and valleys, in or adjacent to gullies.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Darwinia biflora	-	V	V	Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	105	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Darwinia peduncularis	-	V	-	Disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. Rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	14	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Epacris purpurascens var. *purpurascens*	-	V	-	*Epacris purpurascens* var. *purpurascens* has been recorded between Gosford in the north to Avon Dam in the south, in a range of habitats, but most have a strong shale soil influence. Flowers July to September on the Coast, mainly October to November on Tablelands.	146	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No

Eucalyptus camfieldii	Camfield's Stringybark	V	V	Coastal heath on shallow sandy soils overlying Hawkesbury sandstone, mostly on exposed sandy ridges.	3	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	1	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Eucalyptus sp. *Cattai*	-	E4A	CE	*Eucalyptus* sp. Cattai occurs in the area between Colo Heights and Castle Hill, north western Sydney. It occurs as a rare emergent in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small groups. The sites at which it occurs are generally flat and on ridge tops and associated soils are laterised clays overlying sandstone. Suitable habitat unlikely to exist in the locality.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Eucalyptus scoparia	Wallangarra White Gum	E1	V	Open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes.	2	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No

Genoplesium baueri	Yellow Gnat-orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Grammitis stenophylla	Narrow-leaf Finger Fern	E1	-	Rainforest and moist eucalypt forest, usually near streams, on rocks or in trees.	4	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Found in protected and shaded damp situations in riparian habitats.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Hibbertia superans	-	E1	-	*Hibbertia superans* mainly occurs in the north west Sydney region between Baulkham Hills and Wisemans Ferry, with a disjunct occurrence near Mt Boss (inland from Kempsey) on the Mid North Coast of NSW. In the Sydney region it occurs in dry sclerophyll forest on sandstone ridgetops while the northern occurrence is on granite. Flowers July to December.	77	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Kunzea rupestris	-	V	V	Mostly in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park. Shrubland or	1	Unlikely – this species was not recorded during the	No

				heathland, in shallow depressions on large flat sandstone rock outcrops.		field survey and habitat for this species was not present within the study area.	
Lasiopetalum joyceae	-	V	V	Restricted to the Hornsby Plateau south of the Hawkesbury River, between Berrilee and Duffys Forest. Heath on lateritic to shale ridgetops over sandstone.	9	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Leptospermum deanei	Deane's Tea-tree	V	V	Hornsby, Warringah, Ku-ring-gai and Ryde LGAs in the Sydney region. Woodland, riparian scrub and open forest on lower hill slopes or near creeks, on sand or sandy alluvial soil.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Leucopogon fletcheri subsp. *fletcheri*	-	E1	-	Restricted to north-western Sydney between St Albans in the north and Annangrove in the south, within the local government areas of Hawkesbury, Baulkham Hills and Blue Mountains. This species occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs	11	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Melaleuca deanei	Deane's Melaleuca	V	V	Found in heath on sandstone (DEC 2007), and also associated with woodland on broad ridge tops and slopes on sandy loam and lateritic soils (Benson and McDougall 1998). Potential habitat may exist in the locality.	36	Unlikely – this species was not recorded during the field survey and habitat for this	No

						species was not present within the study area.	
Galium australe	Tangled Bedstraw	E1	-	Turpentine forest and coastal Acacia shrubland in NSW. Elsewhere sand dunes, sand spits, shrubland and woodland.	4	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Genoplesium baueri	Bauer's Midge Orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	1	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Grevillea parviflora subsp. *supplicans*	-	E1	-	Confined to the north-west of Sydney near Arcadia and the Maroota–Marramarra Creek area. Heathy woodland associations on skeletal sandy soils over sandstones.	3	Unlikely – this species was not recorded during the field survey.	No
Persicaria elatior	Knotweed	V	V	Beside streams and lakes, swamp forest or disturbed areas.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Persoonia hirsuta	Hairy Geebung	E1	E	*Persoonia hirsuta* occurs from Singleton in the north, south to Bargo and the Blue Mountains to the west. It grows in dry	0	Unlikely – no records within a 5 km radius of the	No

				sclerophyll eucalypt woodland and forest on sandstone. Flowers November to January.		study area and this species was not recorded during the field survey.	
Persoonia mollis subsp. *maxima*	-	E1	E	Restricted to the Hornsby Heights-Mt Colah area north of Sydney. Dry to wet sclerophyll forest, in deep sheltered gullies or steep upper hillsides on Hawkesbury Sandstone.	79	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Pimelea curviflora var. *curviflora*	-	V	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	28	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Pimelea spicata	Spiked Rice-flower	E1	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. Eucalyptus moluccana (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Pomaderris brunnea	Brown Pomaderris	E1	V	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek	1	Unlikely – this species was not recorded during the field survey and habitat for this species was not	No

				lines. Flowers appear in September and October. The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. The species has been found in association with *Eucalyptus amplifolia*, *Angophora floribunda*, *Acacia parramattensis*, *Bursaria spinosa* and *Kunzea ambigua*.		present within the study area.	
Pterostylis saxicola	Sydney Plains Greenhood	E1	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	0	Unlikely – no records within a 5 km radius of the study area and this species was not recorded during the field survey.	No
Syzygium paniculatum	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	3	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Tetratheca glandulosa	Glandular Pink-bell	V	-	Associated with ridgetop woodland habits on yellow earths also in sandy or rocky heath and scrub. Often associated with sandstone / shale interface where soils have a stronger clay influence. Flowers July to November.	80	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	Unlikely – no records within a 5 km radius of the study area and this	No

						species was not recorded during the field survey.	
Rhodamnia rubescens	Scrub Turpentine	E4A	-	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	3	Unlikely – this species was not recorded during the field survey and habitat for this species was not present within the study area.	No

BC ACT STATUS:X – EXTINCT, CE = CRITICALLY ENDANGERED; E = ENDANGERED; E1 = ENDANGERED; E2 = ENDANGERED POPULATION; EPBC ACT STATUS: CE = CRITICALLY ENDANGERED, E = ENDANGERED, V = VULNERABLE, M = MIGRATORY

Table 12: Likelihood of occurrence of threatened fauna species within 5 km of the study area

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Actitis hypoleucos	Common Sandpiper	-	M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Anthochaera phrygia	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of Casuarina cunninghamiana (River Oak).	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Apus pacificus	Fork-tailed Swift	-	M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Ardea ibis	Cattle Egret	-	Marine	Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands.	2	Unlikely – lack of suitable aquatic flora that represent required habitat for this species in the study area	No. Impacts are negligible for this mobile species
Botaurus poiciloptilus	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly Typha spp. (bullrushes) and Eleocharis spp. (spikerushes).	0	No – no suitable habitat in the study area and lack of records in the locality	No.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Calidris acuminata	Sharp-tailed Sandpiper	-	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Calidris ferruginea	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Calidris melanotos	Pectoral Sandpiper	-	M	Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	No – no suitable habitat in the study area and lack of records in the locality	No.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Forest and woodland, urban fringes.	2	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Callocephalon fimbriatum	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	E2; V	-	The population is believed to be largely confined to an area bounded by Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. Found in forest and woodland, urban fringes.	1	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur.	9	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Cercartetus nanus	Eastern Pygmy-possum	V	-	Rainforest, sclerophyll forest (including Box-Ironbark), woodland and heath.	1	Unlikely – lack of suitable habitat in the study area	No
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	0	No – no suitable foraging or roosting habitat in the study area and lack of records in the locality	No
Cuculus optatus	Oriental Cuckoo	-	M	Non-breeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open casuarina, acacia or eucalyptus woodland.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, mallee and *Acacia* woodland.	2	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Dasyornis brachypterus	Eastern Bristlebird	E1	E	Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland,	7	No – no suitable habitat in the study area	No.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.			
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range. Tall (greater than 20m) moist habitats.	5	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Gallinago hardwickii	Latham's Snipe	-	M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	1	No – no suitable habitat in the study area	No. Impacts are negligible for this mobile species
Glossopsitta pusilla	Little Lorikeet	V	-	In NSW, found from the coast westward as far as Dubbo and Albury. Dry open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	1	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	4	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Heleioporus australiacus	Giant Burrowing Frog	V	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population	1	No – no suitable habitat in the study area and	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.		lack of records in the locality	
Hieraaetus morphnoides	Little Eagle	V	-	Throughout the Australian mainland, with the exception of the most densely forested parts of the Dividing Range escarpment. Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodlands and riparian woodlands of interior NSW.	4	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Hirundapus caudacutus	White-throated Needletail	-	M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1	E	Heath or open forest with a heathy understorey on sandy or friable soils.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Lathamus discolor	Swift Parrot	E1	CE; M	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	2	No – no suitable habitat in the study area	No. Impacts are negligible for this mobile species
Litoria aurea	Green and Golden Bell Frog	E1	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and	0	No – no suitable habitat in the study area and lack of records in the locality	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				stream-sides, particularly those containing Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some populations occur in highly disturbed areas.			
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Breeding habitat is the upper reaches of permanent streams and perched swamps. Non-breeding habitat is heath-based forests and woodlands	0	No – no suitable habitat in the study area and lack of records in the locality	No
Macquaria australasica	Macquarie Perch	E1	E	River and lake habitats, especially the upper reaches of rivers and their tributaries.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Micronomus norfolkensis	**Eastern Coastal Free-tailed Bat**	**V**	**-**	**Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.**	**6**	**Likely, suitable foraging and roosting habitat available in the study area**	**Yes (See Appendix C)**
Miniopterus australis	Little Bent-winged Bat	V	-	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	4	Unlikely – lack of suitable foraging or roosting habitat in the study area	No. Impacts are negligible for this mobile species
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of	12	Unlikely – lack of suitable roosting habitat in the study area	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.			
Mixophyes balbus	Stuttering Frog	E1	V	Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Monarcha melanopsis	Black-faced Monarch	-	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Monarcha trivirgatus	Spectacled Monarch	-	M	Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Motacilla flava	Yellow Wagtail	-	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Myiagra cyanoleuca	Satin Flycatcher	-	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests,	0	No – no suitable habitat in the study area and lack of records in the locality	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				especially near wetlands watercourses, and heavily vegetated gullies.			
Myotis macropus	Southern Myotis	V	-	In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers. Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	8	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Ninox connivens	Barking Owl	V	-	Woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Ninox strenua	Powerful Owl	V	-	Woodland, open sclerophyll forest, tall open wet forest and rainforest.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Numenius madagascariensis	Eastern Curlew	-	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Petauroides volans	Greater Glider	-	V	In Eastern Australia, it is found from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). Eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the	0	No – no suitable habitat in the study area and	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.		lack of records in the locality	
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands in eucalypt woodlands and forests.	5	Unlikely, not observed during site inspection	No - area to be impacted not considered primary or critical habitat.
Pluvialis squatarola	Grey Plover	-	M	Mudflats, saltmarsh, tidal reefs and estuaries.	2	No – no suitable habitat in the study area.	No
Pommerhelix duralensis	Dural Land Snail	E1	E	Shale-sandstone transitional landscapes. Found in Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest; Turpentine-Ironbark Forest; Shale/Sandstone Transition Forest; Turpentine Ironbark Margin Forest; Hinterland Sandstone Gully Forest; and Sydney Hinterland Transition Woodland.	15	No – no suitable habitat in the study area.	No
Pandion cristatus	Eastern Osprey	V	-	Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Prototroctes maraena	Australian Grayling	-	V	Coastal rivers and streams, fresh and brackish coastal lagoons.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Pseudomys novaehollandiae	New Holland Mouse	-	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	No – no suitable habitat in the study area and	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
						lack of records in the locality	
Pseudophryne australis	Red-crowned Toadlet	V	-	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. Eggs are laid in moist leaf litter, from where they are washed by heavy rain. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	15	Unlikely – lack of suitable habitat in the study area	No.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	38	Suitable foraging habitat maybe present. No breeding or sheltering habitat.	No. Highly mobile species. No breeding or sheltering habitat impacted. Foraging habitat abundant in locality
Rhipidura rufifrons	Rufous Fantail	-	M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	No – no suitable habitat in the study area and lack of records in the locality	No
Rostratula australis	Australian Painted Snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury	0	Unlikely – lack of suitable habitat in the study area	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.			
Saccolaimus flaviventris	**Yellow-bellied Sheathtail-bat**	**V**	**-**	**It forages for insects above the canopy in eucalypt forests, and closer to the ground in more open country. It is dependent on suitable hollow-bearing trees to provide roost sites. The species has also been recorded using caves and abandoned sugar glider nests as roost sites. Breeding occurs between December and mid-March.**	**7**	**Likely, suitable foraging and roosting habitat available in the study area**	**Yes (See Appendix C)**
Scoteanax rueppellii	**Greater Broad-nosed Bat**	**V**	**-**	**Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands. Woodland, moist and dry eucalypt forest and rainforest.**	**3**	**Likely, suitable foraging and roosting habitat available in the study area**	**Yes (See Appendix C)**
Stagonopleura guttata	Diamond Firetail	V	-	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects. Groups separate into small colonies to breed, between August and January. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	1	Unlikely – lack of suitable habitat in the study area	No
Synemon plana	Golden Sun Moth	E1	CE	Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by Austrodanthonia spp. (wallaby grasses).	0	No – no suitable habitat in the study area and lack of records in the locality	No
Thinornis rubricollis rubricollis	Hooded Plover (eastern)	E4A	V	Forages in sand, rocks and coastal lagoons for marine worms, molluscs, crustaceans, insects, water plants and seeds. At night they favour the upper zones of beaches for roosting. In	0	Unlikely – lack of suitable habitat in the study area	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				eastern Australia, Hooded Plovers usually breed from August to March on sandy ocean beaches, between the high-water mark and the base of the fore-dunes. The nest is a scrape in the sand near debris.			
Tringa nebularia	Common Greenshank	-	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also, widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	0	Unlikely – lack of suitable habitat in the study area	No
Tyto novaehollandiae	Masked Owl	V	-	Often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	6	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Tyto tenebricosa	Sooty Owl	V	-	Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the *Pseudocheirus peregrinus* (Common Ringtail Possum) or *Petaurus breviceps* (Sugar Glider). Nests in very large tree-hollows.	1	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Varanus rosenbergi	Rosenberg's Goanna	V	-	Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens. Lays up to 14 eggs in a termite mound.	1	Unlikely – lack of suitable habitat in the study area	No. Impacts are negligible for this mobile species
Vespadelus troughtoni	Eastern Cave Bat	V	-	A cave-roosting species; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Little is understood of its feeding or breeding requirements or behaviour.	1	Unlikely – lack of suitable roosting habitat in the study area	No

BC ACT STATUS:X – EXTINCT, CE = CRITICALLY ENDANGERED; E = ENDANGERED; E1 = ENDANGERED; E2 = ENDANGERED POPULATION; EPBC ACT STATUS: CE = CRITICALLY ENDANGERED, E = ENDANGERED, V = VULNERABLE, M = MIGRATORY

Appendix C : Biodiversity Conservation Act 2016 – Test of Significance

Under Section 7.3 of the BC Act, a 5-part test is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

SYDNEY TURPENTINE IRONBARK FOREST (STIF)

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	Not applicable. STIF is not a threatened species.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Actions likely to have an adverse effect on STIFF include clearing of native vegetation, fragmentation of habitats and weed invasion. The proposed works impact upon a patch of native vegetation which contains representative canopy species of STIF. This patch of STIF within the study area equates to approximately 0.28 ha. The local occurrence of STIF is considered to be approximately 611.8 ha (see Figure 7). The removal of 0.04 ha of poor condition STIF is unlikely to result in a risk of extinction of this TEC, considering that the majority of the STIF within the study area exists in the locality.
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	The Sydney Turpentine Ironbark Forest in the study area was present in two conditions; poor and planted. The patches of the community in planted condition contained a disturbed midstorey and groundcover layer. Patches in poor condition contained native species in all structural layers with exotic species present in the mid-storey and groundcover layers. These patches did not contain any species unique to the patch or the locality. The species identified in the Sydney Turpentine Ironbark Forest to be removed are well represented throughout the Sydney Turpentine Ironbark Forest to be retained in the locality. The proposal is unlikely to substantially modify the composition of the community such that it is placed at risk of extinction
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposed works will result in the modification of approximately 0.04 ha of STIF. The area impacted includes the selective removal of tree and shrub species.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:	As the proposed works will selectively remove tree and canopy species for the APZ it will not result in an area of STIF to become fragmented or isolated from other areas of habitat.

BC Act	Question	Response
	Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposal would remove 0.04 ha of Sydney Turpentine Ironbark Forest in poor condition. The Sydney Turpentine Ironbark Forest to be removed is in poor condition. The areas to be removed did not contain any species that are unique to the patch or the locality and in some areas lacked structural integrity and complexity. Approximately 0.24 ha of Sydney Turpentine Ironbark Forest would be retained in the study area. This community was in similar condition and structure to the Sydney Turpentine Ironbark Forest to be removed and contained similar flora species. Given that approximately 0.24 ha of Sydney Turpentine Ironbark Forest would be retained in the study area, the Sydney Turpentine Ironbark Forest to be removed is unlikely to be important to the long-term survival of the community.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	No critical habitat (declared areas of outstanding biodiversity value under the BC Act) has been declared for this TEC.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	One key threatening process is relevant to the proposed works, namely clearing of native vegetation. The final determination of STIF identifies clearing as part of the decline of this TEC. Under the proposed works, a small amount of vegetation removal and trimming is unlikely to exasperate this key threatening process.
Conclusion	**Is there likely to be a significant impact?**	No

MICROCHIROPTERAN BATS

Due to similar habitat requirements and associated impacts, a single 5-part test has been undertaken for the following microchiropteran bats:

- *Mormopterus norfolkensis* (Eastern Coastal Freetail-bat)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

C1 *Biodiversity Conservation Act 2016* Test of Significance

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	Whilst these species were not recorded in the study area, there is potential foraging habitat available within the study area. The proposed works would result in the removal of 0.15 ha that represents potential foraging habitat for these species. However, this is based on a worst-case scenario and the actual amount of vegetation clearing may be less. In addition, the proposed vegetation clearance is located on the edge of larger tracts of bushland which remain in the study area and locality. It is therefore unlikely that the removal of a small area of potential foraging habitat would result in a significant change to feeding behaviour. Given these species are highly mobile, the relatively limited amount of habitat proposed for removal, and the fact that vegetation is connected to large areas of quality vegetation directly adjacent to the proposed works area, it is considered unlikely that impacts will occur on this species such that it would place a local population at risk of extinction.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable.
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable.
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community:	The proposal would remove up to 0.15 ha of vegetation that represents potential foraging habitat for these species. All hollow-bearing trees have been avoided

BC Act	Question	Response
	The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	within the APZ. Therefore, no roosting habitat will be removed for these species. The study area is located in a landscape that contains a large amount of vegetation which is likely to contain hollow-bearing trees at a similar or higher ratio as the study area. Therefore, it is unlikely that the habitat to be removed would be considered important for these highly mobile species within the locality.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works would not fragment a patch of foraging habitat into two or more patches. The potential habitat to be removed would not result in the isolation of other foraging or breeding habitat for this species.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposal would remove 0.15 ha of potential foraging habitat for this species. The study area is located in a landscape that contains a large amount of vegetation which is likely to contain similar foraging habitat the study area. Therefore, the proposed works are unlikely to affect breeding or feeding behaviours, and the habitat to be removed is unlikely to be important for this species. In addition, relatively large amounts of potential foraging, and roosting habitat is available immediately adjacent to the study area.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	No critical habitat (declared areas of outstanding biodiversity value under the BC Act) has been declared for these species.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	A key threatening process is defined under the BC Act as *"a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities"* One Key Threatening Processes listed under Schedule 4 of the BC Act are relevant to the current proposal and may pose a threat to this species • Clearing of native vegetation. Given this species is highly mobile, the small amount of native vegetation (0.15 ha) proposed for removal and the availability of foraging and roosting habitat throughout the study area and surrounds, it is considered unlikely that the proposal would significantly exacerbate these KTPs.
Conclusion	**Is there likely to be a significant impact?**	The proposal is unlikely to have a significant impact on the Microchiropteran species given that: • The amount of potential foraging habitat for these species is considered negligible in comparison to the amount of similar habitat

BC Act	Question	Response
		directly adjacent to the site and present throughout the locality. • The proposal would not isolate habitat for these highly mobile species. • The majority of intact and high-quality habitat will be retained in the lot • No hollow-bearing trees will be impacted by the APZ On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of these species. As such, a Species Impact Statement (SIS) is not required

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