FLORA AND FAUNA ASSESSMENT REPORT

PROPOSED DEVELOPMENT

LOT 431 DP 847911
AVOCA DRIVE
GREEN POINT

OCTOBER 2015
REF: 5074

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Conacher Consulting Pty Ltd

Environmental and Land Management Consultants

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PREFACE

This Flora and Fauna Assessment Report has been prepared by *Conacher Consulting* to identify the flora and fauna characteristics of land within Lot 431 DP 847911, Avoca Drive, Green Point.

This report provides an assessment of existing habitats and the potential for the proposed activity to significantly impact on threatened species according to the provisions of Section 5(A) of *the Environmental Planning and Assessment (EP&A) Act* 1979 and the *Threatened Species Conservation Act* 1995.

PROJECT TEAM

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SECTION 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Conacher Consulting has been engaged to prepare a Flora and Fauna Assessment Report for a proposed development within Lot 431 DP 847911, Avoca Drive, Green Point.

This Report has been prepared to identify the flora and fauna characteristics of the subject site and to determine whether or not a Species Impact Statement should be prepared for development according to the provisions of Section 5(A) of the *Environmental Planning & Assessment Act* 1979 (EP&A Act) and the *Threatened Species Conservation Act* 1995 (TSC Act).

1.2 SITE CHARACTERISTICS

The planning and cadastral details of the subject site are provided in Table 1.1.

TABLE 1.1
SITE DETAILS

Location	Lot 431 DP 847911 Avoca Drive Green Point
Subject Site Area	1.9 ha approx.
Local Government Area	Gosford
Existing Land Use	Residential, industrial and vacant land

1.3 PROPOSED DEVELOPMENT

The development being assessed in this Report is the demolition of the existing building structures on the site and the construction of a residential dwelling and four industrial units.

Assessments within this report have taken into account the potential future construction of dwellings and associated infrastructure such as driveway access, landscaping, asset protection zones, and the provision of services.

Detailed plans of the proposed development have been provided as separate documentation to this report.

SECTION 2

FLORA CHARACTERISTICS

2.1 THREATENED FLORA SPECIES

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2015) was undertaken to identify records of threatened flora species located within 5 km of the site. This allowed for a specific search for threatened flora to be undertaken to determine if any threatened flora species are present within the subject site. Details on threatened flora species as listed in Schedules 1 and 2 of Table 2.1.

TABLE 2.1
THREATENED FLORA SPECIES OF THE AREA

Name	TSC Act	EP&BC Act	Habitat Requirements	Comments
Acacia pubescens	V	V	Spreading shrub 1-4 m high growing in open sclerophyll forest and woodlands on clay soils (NSW NPWS 2003).	No suitable habitat present.
Chamaesyce psammogeton	E	-	Prostrate herb. Grows on coastal dunes.	No suitable habitat present.
Darwinia glaucophylla	V	-	Spreading prostrate shrub. Occurs in heath and woodlands associated with sandstone rock platforms.	No suitable habitat present.
Dendrobium melaleucaphilum	E	-	Epiphytic orchid growing frequently on M*elaleuca stypheloides*, less commonly on rainforest trees or on rocks in coastal districts. Flowers July-Oct.	Suitable habitat present.
Epacris purpurascens var. purpurascens	V	-	Occurs in Sydney Sandstone Gully Forest and scrub with periodically poorly drained clay soil on sandstone or shale (NSW NPWS 2002).	No suitable habitat present.
Lindsaea fraseri	E	-	A small rhizome creeping fern. Grows in swamp forest or open forest. Known primarily from the Far North Coast of NSW.	No suitable habitat present.
Melaleuca biconvexa	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation (NSW Scientific Committee 1998).	Suitable habitat present.

TABLE 2.1 THREATENED FLORA SPECIES OF THE AREA				
Name	**TSC Act**	**EP&BC Act**	**Habitat Requirements**	**Comments**
Prostanthera askania	E	E	Erect shrub. Grows in moist sclerophyll forest and warm temperate rainforest communities, as well as the ecotone between them. Habitats are characterised by undulating to moderately steep slopes of the Watagan and Erina soil landscapes and intersecting areas on alluvial soils of the Yarramalong soil landscape (NSW DECC 2006).	No suitable habitat present.
Pultenaea maritima	V	-	Prostrate mat forming shrub with hairy stems. Occurs in grasslands, shrublands and heath on exposed coastal headlands. Distribution Newcastle to Bryon Bay less than 1km from coast.	No suitable habitat present.
Syzygium paniculatum	E	V	Small tree. Subtropical and littoral rainforest on sandy soil (Fairley and Moore 1995).	No suitable habitat present.
Tetratheca juncea	V	V	Prostrate shrub to 1 m high. Typically grows in nutrient poor sandy soils in Smooth-barked Apple, Scribbly Gum, and Spotted Gum dry sclerophyll communities with grassy or heathy understorey. Less commonly recorded from moist forest communities (Ecological Survey and Management 2000).	No suitable habitat present.
Ext = Extinct P. Ext = Presumed Extinct CE = Critically Endangered E = Endangered V = Vulnerable Species				

No threatened flora species were observed within the subject site during surveys.

The threatened flora species listed under the *TSC Act* (1995), considered to have suitable habitat present within the subject, have been assessed under the 7 part test of significance as detailed in Section 4 and Appendix 1 of this report.

2.2 ENDANGERED FLORA POPULATIONS & ECOLOGICAL COMMUNITIES

2.2.1 Endangered Flora Populations

There are no endangered flora populations listed within the *TSC Act* (1995), known from the local government area. No endangered populations were observed within the subject site.

2.2.2 Endangered Ecological Communities

Details regarding the habitat attributes and indicative species for the endangered ecological communities known to be present in the local government area are provided in Table 2.2.

TABLE 2.2 ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	**TSC Act**	**EPBC Act**	**Habitat Requirements**	**Comments**
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC	VEC	**Geology / Soils:** Estuarine mud flats. **Topography:** Intertidal zone on the shores of estuaries and lagoons. **Characteristic Species:** *Sarcocornia quinqueflora, Sporobolus virginicus, Juncus krausii and Baumea juncea*.	Observed during surveys.
Coastal Upland Swamp in the Sydney Basin Bioregion	EEC	EEC	**Geology / Soils:** Periodically waterlogged acidic soils on Hawkesbury Sandstone. **Topography:** Impermeable sandstone plateaus in the headwater valleys of streams and on sandstone benches with abundant moisture seepage. **Characteristic Species:** Highly diverse and variable, includes scrubs, heaths, sedgelands and fernlands.	No suitable habitat present.
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC	-	**Geology / Soils:** Silts, muds or humic loams. **Topography:** Depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. **Characteristic Species:** Composition is variable and dependent on water regime. May include amphibious grasses and sedges, emergent floating herbs and emergent tall sedges and floating and submerged aquatic herbs.	No suitable habitat present.
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	CEEC	-	**Geology / Soils:** Terrigal Formation of the Narrabeen Group. Soils are characterised by Yellow Podzolic Soils and Yellow Earths of the Erina Soil Landscape. **Topography:** Footslopes, gently inclined crests and ridges. **Characteristic Species:** *Eucalyptus racemosa, Angophora costata, Corymbia gummifera, Syncarpia glomulifera, Eucalyptus piperita* and *Allocasuarina littoralis.*	No suitable habitat present.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	CE	**Geology / Soils:** Sand dunes and on soils derived from underlying rocks **Topography:** Located near the seaoin coastal dunes, headland or riparian habitats. **Characteristic Species:** Comprises the *Cupaniopsis anacardioides - Acmena* spp. alliance of Floyd (1990).	No suitable habitat present.

TABLE 2.2 ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	**TSC Act**	**EPBC Act**	**Habitat Requirements**	**Comments**
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	CE	**Geology / Soils**: High nutrient geological substrates, notably basalts and fine-grained sedimentary rocks. **Topography:** Coastal plains and plateaux, footslopes and foothills up to 600m ASL and within the Sydney basin below 350m ALS **Characteristic Species:** Principally encompasses the following groupings of Floyd (1990): *Argyrodendron trifoliatum* alliance (suballiances 1, 5 & 6); *Dendrocnide excelsa* - *Ficus* spp. alliance (suballiances 14 & 15); and *Drypetes australasica – Araucaria cunninghamii* alliance (suballiances 21 & 22).	No suitable habitat present.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	E	-	**Geology / Soils:** Shale-derived soils from Narrabeen series geology **Topography:** Undulating to rolling hills. **Characteristic Species:** *Corymbia maculata* and *Eucalyptus paniculata.*	No suitable habitat present.
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	**Geology / Soils:** Silts, clay-loams and sandy loams. **Topography:** Periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. **Characteristic Species:** Eucalypt canopy with species belonging to the genus Angophora or the sections Exsertaria or Transversaria of the genus Eucalyptus. Has low abundance of *E. robusta*, Casuarina and Melaleuca species and a groundcover of soft-leaved forbs and grasses.	No suitable habitat present.
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	**Geology / Soils:** Waterlogged or periodically inundated grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline. **Topography:** Flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. **Characteristic Species:** *Casuarina glauca.*	Observed during surveys.

TABLE 2.2 ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	**TSC Act**	**EPBC Act**	**Habitat Requirements**	**Comments**
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	**Geology / Soils:** Waterlogged or periodically inundated humic clay loams and sandy loams. **Topography:** Alluvial flats and drainage lines associated with coastal floodplains. **Characteristic Species:** *Eucalyptus robusta, E. longifolia, E. botryoides, Melaleuca quinquenervia* and *M. ericifolia.*	Observed during surveys.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E	-	**Geology / Soils:** Generally on the Warriewood and Tuggerah Soil Landscapes. **Topography:** Freshwater swamps in swales and depressions on sand dunes and low nutrient sand plain sites in coastal areas. **Characteristic Species:** *Eleocharis sphacelata, Baumea juncea, B. rubiginosa, B. articulata, Gahnia sieberiana, Ludwigia peploides* and *Persicaria* sp.	No suitable habitat present.
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E	-	**Geology / Soils:** Found on a range of substrates including old sand dunes above cliffs and on basalt headlands, and less frequently on sandstone. **Topography:** Sea cliffs and coastal headlands. **Characteristic Species:** *Themeda australis.*	No suitable habitat present.
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	E	-	**Geology / Soils:** Holocene sediments of coastal sand. Iron podzols on the Woy Woy Soil Landscape. **Topography:** Sand plains on the Woy Woy Peninsula at Umina and Pearl Beach. **Characteristic Species:** *Eucalyptus botryoides* and *Angophora floribunda* with a diverse understorey of sclerophyllous shrubs.	No suitable habitat present.
Key to TSC Act and EP&BC Act Status Ext = Extinct - P. Ext = Presumed Extinct - CE = Critically Endangered – E = Endangered - V = Vulnerable Species				

The following endangered ecological communities were observed within the subject site during surveys:

- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

The Coastal Saltmarsh EEC is represented by a small patch of saltmarsh vegetation present within the Estuarine Mangrove Scrub vegetation type mapped in Figure 2.1. This EEC does not correspond to the full extent of this vegetation type.

The Swamp Oak Floodplain Forest EEC corresponds to the Swamp Oak Sedge Forest vegetation type mapped within Figure 2.1.

The Swamp Sclerophyll Forest EEC corresponds to the Disturbed Swamp Sclerophyll Forest vegetation type mapped in Figure 2.1

The endangered ecological communities observed within the subject have been assessed under the 7 part test of significance as detailed in Section 4 and Appendix 1 of this report.

2.3 VEGETATION SURVEY METHODOLOGY

To determine the likely and actual occurrence of flora species and plant communities on the subject site, field survey work was undertaken to supplement literature reviews and previous flora surveys of the area. The methods utilised for the flora survey are outlined as follows.

Literature Review

- A review of available literature for the area was undertaken to obtain reference material and background information for this study. These documents are listed in the References section of this Report.

- A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2015) was undertaken to identify records of threatened flora species located within 5 km of the site. This enabled the preparation of a predictive list of threatened flora species that could possibly occur within the habitats found on the site.

Aerial Photograph Interpretation

- Aerial photographs were utilised to identify the extent of vegetation with respect to the site and surrounding areas.

Field Survey

- A field survey which consisted foot traverses within vegetated areas was conducted according to Cropper (1993) to identify the occurrence of flora species and the extent and location of vegetation communities present across the subject site.

- A flora inventory survey was undertaken on 12 October 2015 generally in accordance with the requirements and methodologies of Murray *et al*., (2002). Flora survey locations are shown in Figure 2.1.

- Three 400 m^2 quadrat was sampled within the subject site for all flora species.

- Meander vegetation transects were surveyed within the subject site. A meander transect was was traversed on foot through each vegetation type within the proposed development area, with observation and recording of all species occurring with 2 m. Straight line set length 100m transects were not sampled due to the small size of the subject site. Transects were focussed to the areas of proposed development.

- Details of seasonal flora searches are provided in Table 2.3.

- Specimens of plants not readily identified in the field were collected for identification.

- Specimens of plants tentatively identified as threatened species are sent to the Sydney Royal Botanic Gardens for confirmation of the identification.

- All vascular plants were identified using keys and nomenclature in Harden (1994), Harden and Murray (2000) and Harden (2002). Wherever they were known, changes to nomenclature and classification have been incorporated into the results.

Vegetation Community Nomenclature

- Native vegetation communities were classified and described according to the dominant floristics and the structural formation of the dominant vegetative growth form according to the definitions provided by Walker and Hopkins (1990).

- Corresponding units of available vegetation mapping have been identified where available.

- Corresponding Endangered Ecological Communities listed on both the *TSC Act* (1995) and *EP&BC Act* (1999) are also provided if relevant.

Searches for Cryptic Flora Species
As many threatened flora species are best observed during their flowering period, this survey was unable to detect species which flower at various other times of the year. No suitable habitat is present for threatened seasonally detectable cryptic flora species, therefore further seasonal searches are considered not necessary.

2.4 FLORA SPECIES AND VEGETATION COMMUNITIES DESCRIPTIONS

The following vegetation communities were observed within the subject site during surveys:

- Disturbed Moist Forest;
- Disturbed Swamp Sclerophyll Forest;
- Swamp Oak Sedge Forest;
- Estuarine Mangrove Scrub; and
- Cleared Land / Exotic Vegetation.

Vegetation community descriptions are provided below and a detailed species list is provided in Table 2.4. The locations of vegetation communities are shown in Figure 2.1.

No threatened flora species were observed within the subject site during surveys.

DISTURBED MOIST FOREST

Structure:

Upper Stratum:	To 30 metres high, with 40% Projected Foliage Cover (PFC).
Mid Stratum (upper layer):	To 5 - 15 metres high, with 50% PFC.
Mid Stratum (lower layer):	To 1.5 - 5 metres high, with 70% PFC.
Lower Stratum:	To 1.5 metres high, with 10% PFC.

Floristics:
(Characteristic Species)

Upper Stratum:	*Eucalyptus pilularis*, and *Eucalyptus saligna.*
Mid Stratum (upper layer):	*Callistemon salignus, Melaleuca styphelioides, Cryptocarya microneura, Syncarpia glomulifera* and *Glochidion ferdinandi.*
Mid Stratum (lower layer):	*Ligustrum sinense* and *Lantana camara.*
Lower Stratum:	*Ligustrum sinense, Blechnum cartilagineum, Hypolepis mullerii* and *Calochlaena dubia.*

Exotics: *Ligustrum sinense* and *Lantana camara.*

Variation:
Areas of this vegetation type within the eastern sections of the site contain a cleared and managed understorey which consists predominantly of pasture weeds.

Disturbance:
Disturbances include weed invasion, understorey management and soil disturbances such as filling.

Weed Invasion:
Weed invasion occurs in high levels in the mid stratum and lower stratums.

Location and Distribution:
This community occurs in the northern sections of the site surrounding the existing developed areas as shown in Figure 2.1. This community occupies approximately 0.6 hectares of the subject site.

Classification:
This vegetation community also corresponds to Map Unit E6a Coastal Narrabeen Moist Forest as mapped and described by Bell (2009).

The vegetation present does not correspond to any threatened ecological communities listed under the *TSC Act* (1995) or the *EPBC Act* (1999).

The vegetation is not identified in available Council mapping as comprising an endangered ecological community or regionally significant vegetation.

DISTURBED SWAMP SCLEROPHYLL FOREST

Structure:

Upper Stratum:	To 35 metres high, with 30% PFC.
Mid Stratum (upper layer):	To 15 metres high, with 40% PFC.
Mid Stratum (Lower layer):	To 4 metres high, with 40% PFC.
Lower Stratum:	To 2 metres high, with 30% PFC.

Floristics:
(Characteristic Species)

Upper Stratum:	*Eucalyptus robusta, Eucalyptus resinifera* and *Eucalyptus paniculata.*
Mid Stratum (upper layer):	*Melaleuca nodosa, Melaleuca styphelioides,* and *Callistemon salignus.*
Mid Stratum (lower layer):	*Ligustrum sinense*, *Myrsine variabilis, Cryptocarya microneura, Gahnia melanocarpa,* and *Lantana camara.*
Lower Stratum:	*Lepidosperma laterale, Microlaena stipoides, Hypolepis mullerii.*
Exotics:	*Ligustrum sinense, Lantana camara,* and *Asparagus aethiopicus.*

Variation:
The occurrence of this community within the southern section of the site is intact, compared to the occurrence north of the drainage line which contains high levels of weed invasion.

Disturbance:
Disturbances include weed invasion and historical clearing.

Weed Invasion:
Moderate levels of weed invasion were observed within the mid stratum of this community.

Location and Distribution:
Two patches are present, one large intact patch within the southern section of the site and one disturbed patch along the western site boundary north of the drainage line. This community occupies approximately 0.65 hectares of the subject site as shown in Figure 2.1.

Classification:
This vegetation community also corresponds to Map Unit E43a Estuarine Paperbark Scrub-Forest as mapped and described by Bell (2009).

The vegetation present corresponds to the threatened ecological community, Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, as listed under the *TSC Act* (1995).

SWAMP OAK SEDGE FOREST
Structure:

Upper Stratum:	To 25 metres high, with 60% PFC.
Mid Stratum:	To 2 metres high, with 5% PFC.
Lower Stratum:	To 1 metre high, with 100% PFC.

Floristics:
(Characteristic Species)

Upper Stratum:	*Casuarina glauca.*
Mid Stratum:	*Senna pendula* var. *glabrata.*
Lower Stratum:	*Juncus kraussii* and *Asparagus aethiopicus.*
Exotics:	*Asparagus aethiopicus* and *Senna pendula* var. *glabrata.*

Variation:
A small patch of Sarcocornia quinqueflora occurs within this community.

Disturbance:
No substantial disturbances were observed.

Weed Invasion:
Low levels of weed invasion were observed within the mid and lower stratums.

Location and Distribution:
This community occurs as a single patch south of the drainage line which intersects the site, as shown in Figure 2.1. This community occupies approximately 0.32 hectares of the subject site.

Classification:

This vegetation community corresponds to Map Unit E40 Estuarine Swamp Oak Forest as mapped and described by Bell (2009).

The vegetation present corresponds to the endangered ecological community Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, as listed under the *TSC Act* (1995).

ESTUARINE MANGROVE SCRUB

Structure:

Upper Stratum:	To 6 metres high, with 90% PFC.
Lower Stratum:	To 0.1 metre high, with 0-90% PFC.

Floristics:
(Characteristic Species)

Upper Stratum:	*Avicennia marina subsp. australasica* and *Aegiceras corniculatum.*
Lower Stratum:	*Sarcocornia quinqueflora* and *Sporobolus virginicus.*
Exotics:	None observed.

Variation:
The lower stratum is mostly composed of pneumatophores with the exception of small patches of saltmarsh where canopy cover of mangroves is absent.

Disturbance:
No recent disturbances observed.

Weed Invasion:
None observed.

Location and Distribution:

This community occupies approximately 0.1 hectares and intersects the central area of the site on the southern side of the watercourse as shown in Figure 2.1.

Classification:

This vegetation community also corresponds to Map Unit E47 Estuarine Mangrove Scrub as mapped and described by Bell (2009).

A patch of saltmarsh vegetation which was considered too small to map as a separate community is included within this community. The patch of saltmarsh vegetation corresponds to the endangered ecological community, Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, as listed under the TSC Act (1995).

CLEARED LAND / EXOTIC VEGETATION

Areas of Cleared Land / Exotic Vegetation occur around the existing industrial buildings and dwelling present on the site. These areas are either devoid of vegetation or are predominantly composed of exotic vegetation. Cleared land areas cover approximately 0.23 hectares of the site. It is also likely that some areas mapped as Disturbed Moist Forest have an understorey of Cleared Land, however could not be differentiated during mapping from the aerial photograph due to overhanging canopy cover.

TABLE 2.3
FLORA SPECIES OBSERVED ON THE SUBJECT SITE

Family Name	Scientific Name	Common Name
Upper Stratum		
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm
	Livistona australis	Cabbage Palm
Casuarinaceae	*Allocasuarina torulosa*	
	Casuarina glauca	Swamp Oak
Hamamelidaceae	*Liquidambar styraciflua**	Sweetgum
Lauraceae	*Cryptocarya microneura*	Murrogun
Moraceae	*Ficus elastica**	
	*Morus nigra**	Black Mulberry
Myrsinaceae	*Aegiceras corniculatum*	River Mangrove
Myrtaceae	*Acmena smithii*	
	Angophora costata	Sydney Red Gum
	Eucalyptus acmenoides	
	Eucalyptus paniculata	Grey Ironbark
	Eucalyptus pilularis	Blackbutt
	Eucalyptus resinifera	Red Mahogany
	Eucalyptus resinifera subsp. resinifera	
	Eucalyptus robusta	Swamp Mahogany
	Eucalyptus saligna	Sydney Blue Gum
	Syncarpia glomulifera subsp. glomulifera	
	Syzygium oleosum	
Phyllanthaceae	*Glochidion ferdinandi var. ferdinandi*	Cheese Tree
Rhamnaceae	*Alphitonia excelsa*	Red Ash
Mid Stratum		
Acanthaceae	*Avicennia marina subsp. australasica*	Grey Mangrove
Amygdalaceae	*Prunus spp.**	
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax
Celastraceae	*Maytenus silvestris*	Narrow-leaved Orangebark
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Gahnia melanocarpa*	Black Fruit Saw-sedge
Euphorbiaceae	*Ricinus communis**	Castor Oil Plant
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata**	
Fabaceae (Faboideae)	*Pultenaea flexilis*	Graceful Bush Pea
Fabaceae (Mimosoideae)	*Acacia schinoides*	Green Cedar Wattle
Meliaceae	*Synoum glandulosum subsp. glandulosum*	Scentless Rosewood
Monimiaceae	*Wilkiea huegeliana*	Veiny Wilkiea
Moraceae	*Ficus coronata*	Creek Sandpaper Fig
Myrsinaceae	*Myrsine variabilis*	
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
	Leptospermum polygalifolium	
	Melaleuca nodosa	
	Melaleuca styphelioides	Prickly-leaved Tea Tree
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Oleaceae	*Ligustrum sinense**	
	Notelaea longifolia	Large Mock-olive
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush

TABLE 2.3 FLORA SPECIES OBSERVED ON THE SUBJECT SITE		
Family Name	**Scientific Name**	**Common Name**
Rutaceae	*Citrus X limon*	Lemon
Solanaceae	*Solanum mauritianum**	Wild Tobacco Bush
Verbenaceae	*Lantana camara**	
Lower Stratum		
Alliaceae	*Agapanthus praecox subsp. orientalis**	
Apiaceae	*Cyclospermum leptophyllum**	
	*Hydrocotyle bonariensis**	
Apocynaceae	*Vinca major**	Periwinkle
Araceae	*Monstera deliciosa**	Fruit Salad Plant
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Asteraceae	*Ageratina adenophora**	Crofton Weed
	*Bidens pilosa**	Cobbler's Pegs
	*Cirsium vulgare**	Spear Thistle
	*Conyza sumatrensis**	Tall fleabane
	*Delairea odorata**	
	*Gamochaeta spicata**	Cudweed
	*Hypochaeris radicata**	Catsear
	*Soliva sessilis**	
	*Sonchus oleraceus**	Common Sowthistle
	*Taraxacum officinale**	Dandelion
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
	Doodia aspera	Prickly Rasp Fern
Caryophyllaceae	*Cerastium glomeratum**	Mouse-ear Chickweed
	*Petrorhagia velutina**	
Chenopodiaceae	*Sarcocornia quinqueflora subsp. quinqueflora*	
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Cyperaceae	*Cyperus brevifolius**	
	Lepidosperma laterale	Variable Sword-sedge
Davalliaceae	*Nephrolepis cordifolia*	Fishbone Fern
Dennstaedtiaceae	*Hypolepis muelleri*	Harsh Ground Fern
	Pteridium esculentum	Bracken
Dicksoniaceae	*Calochlaena dubia*	
Fabaceae (Faboideae)	*Medicago sativa subsp. sativa**	
	*Trifolium repens**	White Clover
Goodeniaceae	*Goodenia ovata*	Hop Goodenia
	Selliera radicans	Swamp Weed
Juncaceae	*Juncus kraussii subsp. australiensis*	
	Juncus usitatus	
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Malvaceae	*Sida rhombifolia**	
Myrsinaceae	*Anagallis arvensis**	
Oxalidaceae	*Oxalis debilis var. corymbosa**	
Phormiaceae	*Dianella caerulea*	Blue Flax-lily
	Dianella longifolia	
Plantaginaceae	*Plantago lanceolata**	Lamb's Tongues
Poaceae	*Briza maxima**	Quaking Grass
	*Briza minor**	Shivery Grass

TABLE 2.3
FLORA SPECIES OBSERVED ON THE SUBJECT SITE

Family Name	Scientific Name	Common Name
	*Bromus catharticus**	
	*Chloris gayana**	Rhodes Grass
	Cynodon dactylon	
	*Ehrharta erecta**	Panic Veldt-grass
	Entolasia marginata	Bordered Panic
	Imperata cylindrica	Blady Grass
	Microlaena stipoides	Weeping Grass
	Oplismenus aemulus	
	Panicum simile	Two-colour Panic
	*Pennisetum clandestinum**	Kikuyu Grass
	Sporobolus virginicus var. minor	Marine Couch
	*Stenotaphrum secundatum**	Buffalo Grass
Polygonaceae	*Rumex brownii*	Swamp Dock
Ranunculaceae	*Ranunculus repens**	Creeping Buttercup
Solanaceae	*Solanum nigrum**	Black-berry Nightshade
Uvulariaceae	*Schelhammera undulata*	
Verbenaceae	*Verbena rigida var. rigida**	Veined Verbena
Violaceae	*Viola hederacea*	
Zingiberaceae	*Alpinia caerulea*	Native Ginger
Climbers		
Apocynaceae	*Parsonsia straminea*	Common Silkpod
	*Trachelospermum jasminoides**	
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine
Caprifoliaceae	*Lonicera japonica**	Japanese Honeysuckle
Convolvulaceae	*Ipomoea indica**	Morning Glory
Fabaceae (Faboideae)	*Glycine microphylla*	Small-leaf Glycine
	Kennedia rubicunda	Dusky Coral Pea
Lauraceae	*Cassytha pubescens*	
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Menispermaceae	*Stephania japonica*	Snake vine
Passifloraceae	*Passiflora edulis**	Common Passionfruit
Ranunculaceae	*Clematis aristata*	
	Clematis glycinoides	Headache Vine
Rosaceae	*Rubus moluccanus*	Molucca Bramble
	Rubus parvifolius	Native Raspberry
Rubiaceae	*Morinda jasminoides*	
Smilacaceae	*Smilax australis*	
Vitaceae	*Cissus antarctica*	
	Cissus hypoglauca	Giant Water Vine

Key
Species name^{TS} = Threatened Species * = Introduced Species

2.5 LOCATION AND DISTRIBUTION OF ADJOINING AND CONTIGUOUS HABITATS

An inspection of the available aerial imagery for the local area, review of available vegetation mapping (Bell 2009) and field surveys were undertaken to determine the extent and condition of vegetation within the subject site and surrounding vicinity. The following assessment of connectivity is provided:

North
The site adjoins Avoca Drive and a school development to the north. It is considered that no vegetation connectivity is present between the site and areas of natural habitats to this aspect.

East
The site directly adjoins the Davistown Road Bushland Reserve to the east.

South
The site directly adjoins the Davistown Road Bushland Reserve to the south.

West
The site adjoins areas of bushland within two rural-residential allotments to the west.

The proposed development area of the site contains existing buildings and highly disturbed habitats with poor connectivity for local biodiversity. the higher quality habitats within the southern section of the site contain suitable connectivity between areas east and west of the site are proposed to be retained. The current level of connectivity between the site and areas to the south is also likely to be retained.

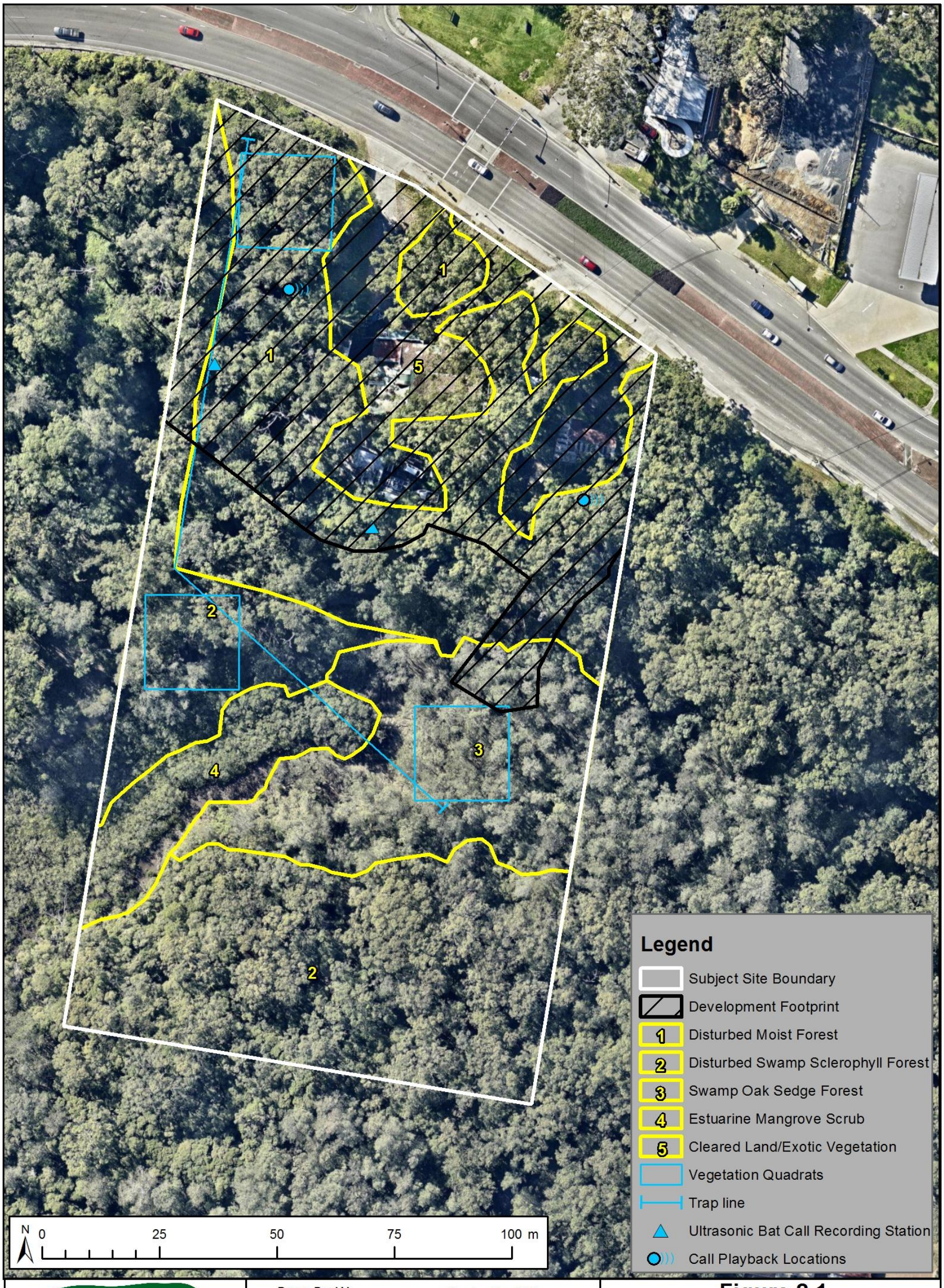

Figure 2.1
Flora and Fauna Characteristics
Avoca Drive, Green Point

SECTION 3

FAUNA AND FAUNA HABITATS

3.1 THREATENED FAUNA SPECIES

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2015) was conducted for threatened fauna species recorded within 10km of the subject site. This revealed a number of threatened species that have been recorded in the area. Details on threatened fauna species as listed in Schedule 1 and 2 of the *TSC Act* (1995) with a known or possible occurrence within the local area are provided in Table 3.1. Species which exclusively inhabit marine, estuarine and beach environments have been omitted due to a lack of suitable habitat within the study area.

TABLE 3.1
THREATENED FAUNA SPECIES OF THE AREA

Common Name Scientific Name	TSC Act	EP&BC Act	Preferred Habitat	Comments
Red-crowned Toadlet *Pseudophryne australis*	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Shelters under logs and rocks in non-breeding periods (NSW OEH 2015).	No suitable habitat present.
Green and Golden Bell Frog *Litoria aurea*	E	V	Breeding habitat consists of shallow (<1m) ponds or slowly moving waterways which undergo disturbance regimes such as fluctuating water flow or freshwater with inflow of saline water with both areas of open water and dense low vegetation (NSW NPWS 1999).	Suitable habitat present.
Green-thighed Frog *Litoria brevipalmata*	V		Found in rainforests and open forests within or at the edge of streams, swamps, lagoons, dams and ponds (NSW OEH 2015).	No suitable habitat present.
Green Turtle *Chelonia mydas*	V	V	Marine turtle which nests, forages and migrates across tropical northern Australia, however may stray into temperate waters. Forages in seaweed-rich coral and rocky reefs and inshore seagrass pastures. Breeds on sandy beaches (Limpus 2008).	No suitable habitat present.
Leathery Turtle *Dermochelys coriacea*	E	E	Pelagic turtle known from all waters around Australia. Ventures close to shore mainly during the nesting season, with nesting taking place on sandy beaches.	No suitable habitat present.
Rosenberg's Goanna *Varanus rosenbergi*	V	-	Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops (Cogger 2000).	No suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	**TSC Act**	**EP&BC Act**	**Preferred Habitat**	**Comments**
Stephens' Banded Snake *Hoplocephalus stephensii*	V	-	A nocturnal and partly arboreal species that inhabits open and closed forest communities sheltering under bark, in hollows and under exfoliating slabs of granite (Cogger 2000).	Suitable habitat present.
Wompoo Fruit-Dove *Ptilinopus magnificus*	V	-	Inhabits large undisturbed patches of lowland, adjacent highland rainforest and moist eucalypt forests feeding on fruit (Higgins and Davies 1996).	Suitable habitat present.
Superb Fruit-Dove *Ptilinopus superbus*	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrublands with native fruits (Higgins and Davies 1996).	Suitable habitat present.
Black-necked Stork *Ephippiorhynchus asiaticus*	E		Prefers shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters and adjacent habitats. Also forages within estuaries and along intertidal shorelines, such as saltmarshes, mudflats and sandflats, and mangrove vegetation (Marchant and Higgins 1990).	Suitable habitat present.
Black Bittern *Ixobrychus flavicollis*	V	-	Prefers permanent freshwater wetlands with tall, dense vegetation (Lindsey 1992).	No suitable habitat present.
Black-breasted Buzzard *Hamirostra melanosternon*	V		Occurs within riverine and tropical eucalypt woodlands, shrub steppes, arid scrubs, grassy plains and sandy deserts.	No suitable habitat present.
Square-tailed Kite *Lophoictinia isura*	V		Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds.	Suitable habitat present.
Little Eagle *Hieraaetus morphnoides*	V		Inhabits a variety of habitats including woodland open forest, partially cleared areas, along watercourses and around wetlands (Marchant and Higgins 1993).	Suitable habitat present.
Eastern Osprey *Pandion cristatus*	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding.	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	**TSC Act**	**EP&BC Act**	**Preferred Habitat**	**Comments**
Bush Stone-curlew *Burhinus grallarius*	E	-	Utilises open forests, savannah woodlands, dune scrub, savannah and mangrove fringes (Marchant and Higgins 1993).	Suitable habitat present.
Sooty Oystercatcher *Haematopus fuliginosus*	V	-	Exclusively coastal in distribution foraging along rocky coastlines and estuaries (Marchant and Higgins 1993).	No suitable habitat present.
Pied Oystercatcher *Haematopus longirostris*	E	-	Inhabits coastal beaches and estuarine flats (Marchant and Higgins 1993).	No suitable habitat present.
Terek Sandpiper *Xenus cinereus*	V	-	Almost exclusively coastal species feeding along estuarine mudflats, coral reefs, mangrove swamps and beaches (Higgins and Davies 1996).	No suitable habitat present.
Gang-gang Cockatoo *Callocephalon fimbriatum*	V		Prefers wetter forests and woodlands from sea level to > 2000m on Divide, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmland and suburban gardens (Higgins 1999).	Suitable habitat present.
Glossy Black-Cockatoo *Calyptorhynchus lathami*	V		Open forests with *Allocasuarina* species and hollows for nesting (Higgins 1999).	Suitable habitat present.
Swift Parrot *Lathamus discolor*	E	E	Within NSW inhabits eucalypt forests and woodlands with winter flowering eucalypts (Saunders and Tzaros 2011).	Suitable habitat present.
Little Lorikeet *Glossopsitta pusilla*	V		Inhabits forests and woodlands feeding mostly on nectar and pollen particularly in profusely-flowering eucalypts (Courtney and Debus 2006).	Suitable habitat present.
Barking Owl *Ninox connivens*	V		Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting (Higgins 1999).	Suitable habitat present.
Powerful Owl *Ninox strenua*	V		Mature forests containing large hollows for breeding & densely vegetated gullies for roosting (Higgins 1999).	Suitable habitat present.
Masked Owl Tyto novaehollandiae	V		Open forest & woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting (Higgins 1999).	Suitable habitat present.
Sooty Owl *Tyto tenebricosa*	V	-	Tall, dense, wet forests containing trees with very large hollows for roosting and breeding (Higgins 1999).	No suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	**TSC Act**	**EP&BC Act**	**Preferred Habitat**	**Comments**
Regent Honeyeater *Anthochaera phrygia*	CE	E	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts (Higgins e*t al.*, 2001).	Suitable habitat present.
Varied Sittella *Daphoenositta chrysoptera*	V		Prefers open eucalypt woodlands and forests, mallee, inland acacia, coastal tee-tree scrubs, parks and gardens (Higgins and Peter 2002).	Suitable habitat present.
Spotted-tailed Quoll *Dasyurus maculatus*	V	E	Inhabits a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Shelters in hollow-bearing trees, fallen logs, small caves and rock crevices (NSW NPWS 1999).	No suitable habitat present.
Eastern Quoll *Dasyurus viverrinus*	E	-	Dry and moist sclerophyll forests containing hollow logs, rock caves, abandoned burrows or trees with open grazing land interspersed. Extinct on the mainland.	No suitable habitat present.
Koala *Phascolarctos cinereus*	V	V	Inhabits both wet & dry eucalypt forest on high nutrient soils containing preferred feed trees (Reed *at al*., 1991).	No suitable habitat present.
Eastern Pygmy-possum *Cercartetus nanus*	V	-	Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs (Turner and Ward 1995).	Suitable habitat present.
Yellow-bellied Glider *Petaurus australis*	V		Inhabits tall mature eucalypt forests with high nectar producing species and shelters in large hollow bearing trees (Goldingay and Kavanagh 1991).	Suitable habitat present.
Squirrel Glider *Petaurus norfolcensis*	V		Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and coastal forest with heath understorey. Shelters in tree hollows (Suckling 1995).	Suitable habitat present.
Long-nosed Potoroo *Potorous tridactylus*	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey (Seebeck et al., 1989).	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	**TSC Act**	**EP&BC Act**	**Preferred Habitat**	**Comments**
Parma Wallaby *Macropus parma*	V	-	Inhabits rainforests and wet and dry sclerophyll forests with a dense understorey and associated grassy patches (Menkhorst 2001).	No suitable habitat present.
Eastern Chestnut Mouse *Pseudomys gracilicaudatus*	V	-	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps (NSW OEH 2015).	Suitable habitat present.
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy (Tidemann 1995).	Suitable habitat present.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V	-	Inhabits wet and dry sclerophyll forest, open woodland, shrubland, mallee, grassland and desert. Roosts in tree hollows (Churchill 2008).	Suitable habitat present.
Eastern Freetail-bat *Mormopterus norfolkensis*	V		Inhabits eucalypt forest and woodland on the coastal side of the Great Dividing Range. Roosts in tree hollows, under bark and in various man-made structures (Churchill 2008).	Suitable habitat present.
Large-eared Pied Bat *Chalinolobus dwyeri*	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies (Churchill 2008).	Suitable habitat present.
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V		Inhabits wet sclerophyll forest, open forest, rainforest and coastal mallee. Roosts mostly in roosts in hollow trunks of eucalypts but also in caves and man-made structures (Churchill 2008).	Suitable habitat present.
Little Bentwing-bat *Miniopterus australis*	V		Inhabits rainforest, vine thicket, wet and dry melaleuca swamps and coastal forests. Roosts in caves, man-made structures such as abandoned mines and buildings and occasionally banana trees and tree hollows (Churchill 2008).	Suitable habitat present.
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*	V		Inhabits rainforest, wet and dry sclerophyll forest, open woodland, Melaleuca forests and open grassland. Roosts in caves and man-made structures (Churchill 2008).	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	**TSC Act**	**EP&BC Act**	**Preferred Habitat**	**Comments**
Southern Myotis *Myotis macropus*	V		Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water (Churchill 2008).	Suitable habitat present.
Greater Broad-nosed Bat *Scoteanax rueppellii*	V		Inhabits moist gullies in mature coastal forest, rainforest, open woodland, Melaleuca swamp woodland, wet and dry sclerophyll forest, cleared areas with remnant trees and tree-lined creeks in open areas. Roosts in tree hollows, cracks and fissures in trunks and dead branches, under exfoliating bark, and in man-made structures (Churchill 2008).	Suitable habitat present.
CE = Critically Endangered Species Ext. = Presumed Extinct Species V = Vulnerable Species E = Endangered Species				

The threatened fauna species, Little Bentwing-bat, was observed during surveys.

The observation locations are shown in Figure 2.1. The threatened fauna species which are considered to have suitable habitat within the subject have been assessed under the 7 part test of significance as detailed in Section 4 and Appendix 1 of this report.

3.2 ENDANGERED FAUNA POPULATIONS

There are no endangered fauna populations are listed within the local government area.

3.3 FAUNA HABITATS

The fauna habitats present consist of wet sclerophyll forest, forested wetland and cleared / disturbed areas. An unmapped tidal watercourse intersects the central section of the site. No hollow bearing trees were observed during the hollow bearing tree assessment undertaken.

Amphibians
The watercourse which intersects the site is not likely to provide habitat for amphibians as the waters are tidal and likely to be too saline. Amphibians, however, may utilise areas of forest vegetation within the site as shelter and foraging habitats.

Reptiles
Suitable foraging habitat is present for locally common reptile species. No areas of substantial rock outcropping were observed.

Birds
The flower, nectar, fruit and seed producing tree and shrub species provide a seasonal foraging resource for bird species. The estuarine habitats present provide habitat for waterbirds. No tree hollows suitable for nesting were observed within the subject site.

Mammals
The flower, nectar, fruit and seed producing tree and shrub species provide a seasonal foraging resource for arboreal mammals and bat species. Arboreal habitats consist of patchy canopy cover surrounding the existing development areas of the site and intact forested wetland habitats within the southern section of the site. Understorey habitats for mammals consist of cleared land surrounding the existing buildings within the northern section of the site surrounded by disturbed weed infested forested habitats within the northern section of the site and forested wetland habitats within the southern section of the site.

3.4 FAUNA SURVEY METHODOLOGY

In order to detect the possible occurrence of threatened fauna species specific methods targeting these species were employed.

Literature Review

- Review of local resource documents;

- A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2015) was undertaken to identify records of threatened fauna species located within 5 km of the site. This enabled the preparation of a predictive list of threatened fauna species that could possibly occur within the habitats found on the site.

Fauna Surveys
Fauna survey stratification, sampling and replication was undertaken generally in accordance with the requirements and methodologies of Murray *et al.,* (2012). The methods that were utilised consisted of:

- Targeted nocturnal and diurnal reptile and amphibian searches;
- Diurnal and nocturnal bird surveys;
- Diurnal and nocturnal mammal surveys;
- Recorded call playback for threatened nocturnal amphibian, bird and mammal species;
- Spotlighting;
- Microchiropteran bat echolocation call detection;
- Koala habitat assessment;
- Habitat searches and opportunistic observations during the completion of method specific fauna surveys; and
- Hollow bearing tree survey.

Fauna trapping surveys were undertaken for one stratification unit due to the small size of the site.

Fauna survey details are shown in Table 2.2 and fauna survey locations are shown in Figure 2.1. A summary of the weather conditions during fauna surveys is provided in Appendix 2.

TABLE 2.2
FAUNA SURVEY DETAILS

Survey Type	Survey Methods	Survey Effort/Time
Diurnal Surveys	Diurnal bird census Diurnal reptile census Diurnal amphibian census Hollow bearing tree survey Koala habitat assessment	12 October 2015 0830-1630 (8hrs) 13 October 2015 0800-0900 (1hr) 14 October 2015 0715-0745 (0.5 hrs) 15 October 2015 0800-0830 (0.5 hrs) Total = 10hrs
Nocturnal Surveys	Spotlighting / Stag watching Nocturnal Amphibian Search Nocturnal Reptile Search Nocturnal Mammal Search	14 October 2015 1930-2030 (1hr) 15 October 2015 1930-2030 (1hr) Total = 2hrs
	Call playback census for threatened fauna	14 October 2015 2000-2030 (0.5hrs) 15 October 2015 2000-2030 (0.5hrs) Total = 2 call playback nights
	Microchiropteran bat ultrasonic call recording	12-14 October 2015 Overnight x 2 units 6 x Microchiropteran bat ultrasonic call recording nights

TABLE 2.2 FAUNA SURVEY DETAILS		
Survey Type	**Survey Methods**	**Survey Effort/Time**
Trapping Surveys	Arboreal Mammal Trapping (10 traps x 3 nights) Small Terrestrial Mammal Trapping (10 elliot a traps x 3 nights) Medium Terrestrial Mammal Trapping (10 elliot b traps/ 1 cage trap x 3 nights)	12 – 15 October 2015 30 Arboreal trap nights 30 Small terrestrial mammal trap nights 33 Medium terrestrial mammal trap nights

3.5 FAUNA OBSERVED

The fauna species observed within the subject site are listed in Table 3.3. The threatened fauna species, Little Bentwing-bat was observed during surveys. The species was detected from one call made on 13 October 2015 at 0322.

Threatened species observation locations are shown in Figure 2.1. All other fauna species observed are considered relatively common within the local area.

TABLE 3.3 FAUNA OBSERVED AND RECORDED WITHIN THE SUBJECT SITE		
Common Name	**Scientific Name**	**Observation Type**
Amphibians		
Brown-striped Frog	*Limnodynastes peronii*	W
Reptiles		
Eastern Water Dragon	*Physignathus lesueurii*	O
Land Mullet	*Egernia major*	O
Dark-flecked Garden Sunskink	*Lampropholis delicata*	O
Birds		
Masked Lapwing	*Vanellus miles*	W
Rainbow Lorikeet	*Trichoglossus haematodus*	OW
Musk Lorikeet	*Glossopsitta concinna*	W
Sulphur-crested Cockatoo	*Cacatua galerita*	W
Little Corella	*Cacatua sanguinea*	OW
Galah	*Eolophus roseicapillus*	OW
Eastern Rosella	*Platycercus eximius*	OW
Sacred Kingfisher	*Todiramphus sanctus*	OW
Eastern Koel	*Eudynamys orientalis*	W
Channel-billed Cuckoo	*Scythrops novaehollandiae*	OW
Welcome Swallow	*Hirundo neoxena*	OW
Rufous Fantail	*Rhipidura rufifrons*	OW
Black-faced Monarch	*Monarcha melanopsis*	OW
Golden Whistler	*Pachycephala pectoralis*	W
Eastern Whipbird	*Psophodes olivaceus*	OW
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	OW
Brown Gerygone	*Gerygone mouki*	OW
Brown Thornbill	*Acanthiza pusilla*	OW
White-browed Scrubwren	*Sericornis frontalis*	OW

TABLE 3.3
FAUNA OBSERVED AND RECORDED WITHIN THE SUBJECT SITE

Common Name	Scientific Name	Observation Type
Superb Fairy-wren	*Malurus cyaneus*	OW
Spotted Pardalote	*Pardalotus punctatus*	OW
Scarlet Honeyeater	*Myzomela sanguinolenta*	OW
Eastern Spinebill	*Acanthorhynchus tenuirostris*	OW
Lewin's Honeyeater	*Meliphaga lewinii*	OW
Yellow-faced Honeyeater	*Lichenostomus chrysops*	OW
White-cheeked Honeyeater	*Phylidonyris niger*	OW
Noisy Miner	*Manorina melanocephala*	OW
Noisy Friarbird	*Philemon corniculatus*	W
Red-browed Finch	*Neochmia temporalis*	OW
Olive-backed Oriole	*Oriolus sagittatus*	W
Green Catbird	*Ailuroedus crassirostris*	OW
Australian Magpie	*Cracticus tibicen*	OW
Australian Raven	*Corvus coronoides*	OW
Red-whiskered Bulbul*	*Pycnonotus jocosus*	W
Mammals		
Brown Antechinus	*Antechinus stuartii*	T
Bush Rat	*Rattus fuscipes*	T
Black Rat *	*Rattus rattus*	T
Eastern Horseshoe-bat	*Rhinolophus megaphyllus*	U
White-striped Freetail-bat	*Tadarida australis*	U
Little Bentwing-bat [TS]	***Miniopterus australis***	U
Gould's Wattled Bat	*Chalinolobus gouldii*	U
Little Forest Bat	*Vespadelus vulturnus*	U

Key to Observation Type

E - Nest / Roost
F - Tracks / Scratchings / Chew Marks
FB - Burrow
G - Crushed Cones
H - Hair / Feathers / Skin
K - Dead
M - Miscellaneous Record
O - Observed
OW - Observed and Heard Call
P - Scat
Q - Camera
T - Trapped
U - Ultrasonic Recording
W - Heard

Note: * indicates introduced species. [TS] indicates threatened species TSC Act NSW.

SECTION 4

ASSESSMENTS AND CONCLUSIONS

4.1 ENVIRONMENTAL PROTECTION & BIODIVERSITY CONSERVATION ACT (1999) ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act*, (1999) requires that Commonwealth approval be obtained for certain actions. The Act provides an assessment and approvals systems for actions that have a significant impact on matters of National Environment Significance (NES). These may include:-

- Wetlands protected by international treaty (the Ramsar Convention);
- Nationally listed threatened species and ecological communities;
- Nationally listed migratory species.

Actions are projects, developments, undertakings, activities, series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on a NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, the matter needs to be referred to the Australian Government Department of the Environment (AGDE).

The following assessment in accordance with the EP&BC Act Policy Statement 1.1 *Significant Impact Guidelines* (AGDE 2013) is provided:

i. Are there any Matters of National Environmental Significance located in the area of the proposed action?

A search of the Protected Matters Search Tool (AGDE 2015) was conducted for EPBC Listed threatened and migratory species recorded within 5 km of the subject site.

Suitable habitat is present for the following nationally listed threatened or migratory species recorded from the Protected Matters Search (AGDE 2015) which occur or which may occur within 5 km of the subject site:

Threatened Species

- *Melaleuca biconvexa*
- Green and Golden Bell Frog (*Litoria aurea*)
- Swift Parrot (*Lathamus discolor*)
- Regent Honeyeater (*Anthochaera phrygia*)
- Long-nosed Potoroo (*Potorous tridactylus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)

No nationally listed threatened fauna species were observed during surveys.

Migratory Species

- Rainbow Bee-eater *(Merops ornatus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Spectacled Monarch (Monarcha trivirgatus)
- Fork-tailed Swift (*Apus pacificus*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Rufous Fantail (*Rhipidura rufifrons*)

The nationally listed migratory species, Black-faced Monarch, was identified by the call of one individual within the site on 12 October 2015.

The nationally listed migratory species, Rufous Fantail, was observed foraging within the site (one individual) on 12 October 2015.

Threatened Ecological Communities
No nationally listed threatened ecological communities were observed within the subject site. The saltmarsh vegetation within the Estuarine Mangrove Scrub vegetation type observed does not meet the required condition thresholds for inclusion as the Subtropical and Temperate Coastal Saltmarsh threatened ecological community under the *EPBC Act* (1999).

ii. Considering the proposed action at its broadest scope, is there potential for impacts on Matters of National Environmental Significance?

The proposal will require the removal of approximately 0.22 hectares of forested habitats for buildings and site access and the modification of approximately 0.25 hectares of forested habitats for APZs.

These areas provide suitable foraging habitat for nationally listed locally occurring threatened and migratory species.

iii. Are there any proposed measures to avoid or reduce impacts on Matters of National Environmental Significance?

The proposed development has have been situated within the northern disturbed sections of the site to minimise impacts associated with clearing of vegetation and habitats for nationally listed threatened and migratory biodiversity.

iv. Are any impacts of the proposed action on Matters of National Environmental Significance likely to be significant impacts?

Nationally Listed Threatened Species
With regard to nationally listed threatened species it is considered that the proposal is not likely to:
- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat;
- introduce disease that may cause a species to decline; or
- interfere with the recovery of the species.

The following reasons are provided:
- No nationally listed threatened species were observed within the subject site during surveys;
- There are larger areas of higher quality habitat for locally occurring nationally listed threatened species within the locality, including lands reserved for conservation such as Kincumba Mountain Reserve and Bouddi National Park; and
- The area of proposed habitat loss is relatively small in area, and the majority of the intact habitats present will be retained.

Nationally Listed Migratory Species
With regard to nationally listed migratory species it is considered that the proposal is not likely to:
- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;

- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The following reasons are provided:
- The subject site does not contain important habitat for a nationally listed migratory species; and
- The area of proposed habitat loss is relatively small in area.

Nationally Listed Threatened Ecological Communities
It is considered that the proposal is not likely to have a significant impact on nationally listed endangered or critically ecological communities as the proposal is not likely to:
- reduce the extent of an ecological community
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- adversely affect habitat critical to the survival of an ecological community
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established, or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
- interfere with the recovery of an ecological community.

The following reasons are provided:
- The vegetation within the subject site does not correspond to a nationally listed endangered or critically endangered ecological community.

CONCLUSION
It is considered that the proposed action is not likely to have a significant impact on nationally listed threatened or migratory species or nationally listed threatened ecological communities.

4.2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)

The *Environmental Planning and Assessment Act* (1979) is a state applicable act administered by the NSW State Government. Section 5(A) of the *EP&A Act* 1979 provides seven factors (referred to as the assessment of significance or 7 part test) which must be taken into account by a consent authority in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats, listed within the *Threatened Species Conservation Act* (1995).

An assessment of significance has been undertaken for threatened species, populations and ecological communities listed within the *TSC Act* (1995), observed or with suitable habitat contained within the subject site. The assessment is provided as Appendix 1 to this report and results of the assessment are summarised below.

TSC Act Listed Threatened Species
No threatened flora species observed within the subject site during surveys.

The fauna threatened species, Little Bentwing-bat, as listed within the *TSC Act* (1995), was observed within the subject site during surveys.

The Section 5A Assessment of Significance completed in Appendix 1 has determined that the proposed development is not likely to have a significant impact on threatened species listed within the *TSC Act* (1995) for the following reasons:

- The proposed development is not likely to have an adverse effect on the life cycle of a threatened species such that a viable population of the species is likely to be placed at risk of extinction.

- An area of habitat is not likely to become fragmented or isolated from other areas of habitat as a result of the proposed action.

- The area of habitat to be removed or modified by the proposed development is of low importance to the long-term survival of threatened species in the locality.

TSC Act Listed Threatened Populations
No threatened populations were observed within the subject site.

The Section 5A Assessment of Significance completed in Appendix 1 has determined that the proposed development is not likely to have a significant impact on threatened populations listed within the *TSC Act* (1995) as there were no threatened populations observed within the subject site and the proposed action will not have an adverse effect on the life cycle of any species that constitutes an endangered population.

TSC Act Listed Threatened Ecological Communities
The following threatened ecological communities were observed within the subject site:

- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

The Section 5A Assessment of Significance completed in Appendix 1 has determined that the proposed is not likely to have a significant effect on threatened ecological communities (or their habitats) as listed within the *TSC Act* (1995) for the following reasons:

- The proposed development is not likely to have an adverse effect on the extent or adversely modify the composition of a threatened ecological community such that the local occurrence is likely to be placed at risk of extinction;

- An area of habitat for a threatened ecological community is not likely to become fragmented or isolated from other areas of habitat as a result of the proposed development; and

- The area of habitat to be removed or modified by the proposed development is of low importance to the long-term survival of threatened ecological communities in the locality.

Conclusions
It is concluded that:

- The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats.

- A Species Impact Statement is not required for the proposed development

4.3 STATE ENVIRONMENTAL PLANNING POLICIES

SEPP 14 - Coastal Wetlands
The subject site contains land mapped as subject to SEPP 14 Coastal Wetlands.
SEPP 26 - Littoral Rainforest
The subject site is not included within any area mapped as a littoral rainforest in SEPP 26. The vegetation on-site does not correspond to Littoral Rainforest with respect to species composition and substrate.

SEPP 44 - Koala Habitat Assessment
The subject site was assessed for activity by Koalas using the following methods:

i. A search of the BioNet Atlas of NSW Wildlife (NSW OEH 2015) was undertaken to identify records of Koalas in the area;

ii. The site was surveyed on foot with any species of Koala food trees being inspected for signs of Koala usage. Trees were inspected and identified for presence of Koalas, scratch and claw marks on the trunk and scats around the base of each tree. The proportion of any trees showing signs of Koala use was calculated for the whole of the site. Additionally the location and density of droppings if found were documented;

iii. Koalas were also targeted during spotlight surveys;

iv. Identification and assessment of the density of tree species listed as Koala food trees in State Environmental Planning Policy No. 44 - Koala Habitat Protection was undertaken across the site.

TABLE 4.1
SEPP-44 KOALA FEED TREE SPECIES
(From SEPP-44 Schedule 2)

Scientific Name	Common Name	Observed On Site	Percentage within survey plots
Eucalyptus tereticornis	Forest Red Gum	No	0%
Eucalyptus microcorys	Tallowwood	No	0%
Eucalyptus punctata	Grey Gum	No	0%
Eucalyptus viminalis	Ribbon or Manna Gum	No	0%
Eucalyptus camaldulensis	River Red Gum	No	0%
Eucalyptus haemastoma	Broad-leaved Scribbly Gum	No	0%
Eucalyptus signata	Scribbly Gum	No	0%
Eucalyptus albens	White Box	No	0%
Eucalyptus populnea	Bimble Box or Poplar Box	No	0%
Eucalyptus robusta	Swamp Mahogany	Yes	<15%

The Koala food tree species, Eucalyptus robusta, as listed on Schedule 2 of State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44) was observed within the subject site.

The subject site does not contain areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component, therefore the site does not contain potential koala habitat as defined by SEPP 44.

No Koalas were observed during the fauna survey and no evidence of Koala habitation, such as scats, claw and scratch marks, were located on the site. Therefore the subject site is considered to not form core koala habitat as defined by SEPP 44.

4.4 SPECIFIC LOCAL GOVERNMENT AREA REQUIREMENTS AND ASSESSMENTS

No specific local government area assessment requirements have been identified.

4.5 CONCLUSIONS & RECOMMENDATIONS

Based on the detailed field survey and information provided in this report it is concluded that:

i. No threatened flora species listed within the *TSC Act* or the *EPBC Act* were observed within the subject site.

ii. The threatened fauna species, Little Bentwing-bat (*Miniopterus australis*), as listed within the *TSC Act* were observed within the subject site during surveys.

iii. No threatened populations listed within the *TSC Act* (1995) or the *EP&BC Act* (1999) were observed within the subject site.

iv. No following threatened ecological communities listed within the *TSC Act* (1995) were observed within the subject site during surveys:

- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

v. The following migratory species listed within the *EPBC Act* (1999), were observed within the subject site:

- Black-faced Monarch (*Monarcha melanopsis*)
- Rufous Fantail (*Rhipidura rufifrons*)

vi. A referral to the Australian Government Department of the Environment is considered unnecessary.

vii. The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats.

viii. A Species Impact Statement is not required for the proposed development.

Based on the detailed field survey and information provided in this report it is recommended that:

- Swamp Sclerophyll Forest EEC Trees be retained within APZ areas.

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APPENDIX 1

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)
SECTION 5(A) ASSESSMENT

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)
SECTION 5(A) ASSESSMENT

As identified in Section 5(A) of the *EP&A Act* 1979 the following matters need to be addressed to determine whether or not a significant effect on threatened species, populations or ecological communities or their habitats is likely to result from the proposed development.

A1.1 ASSESSMENT OF SIGNIFICANCE / 7 – PART TEST

For the purposes of the following assessments the definitions of specific terminology and interpretations of the key terms used are as per the DECC (2007) Threatened species assessment guidelines. Further clarification is also provided where deemed appropriate.

a) In the case of a threatened species, whether the action proposed 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,

Threatened Flora Species

Dendrobium melaleucaphilum
This species grown on *Melaleuca styphelioides* and less commonly on rainforest trees or on rocks in coastal districts (OEH 2015).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Melaleuca biconvexa
This species is a paperbark shrub or small tree which prefers poorly drained habitats near swamps and along drainage lines. This species occurs in disjunct populations from near Jervis Bay to Port Macquarie with the main concentration of records on the Central Coast in the Gosford and Wyong local government areas (NSW Scientific Committee 1998).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Threatened Fauna Species

Green and Golden Bell Frog (*Litoria aurea*)
The Green and Golden Bell Frog is largely aquatic and is found among vegetation within or at the edges of permanent water. The males call mainly after rain from spring to autumn while afloat among vegetation, usually in larger permanent dams, swamps and lagoons. Breeding often peaks after heavy rains in January to February (NSW NPWS 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Stephen's Banded Snake (*Hoplocephalus stephensii*)
Stephen's Banded Snake frequents coastal rainforests and wet sclerophyll forests. This species shelters beneath loose bark, among epiphytes, in hollow trunks, limbs and rock crevices. This species is nocturnal and partly arboreal (Cogger 2000).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Wompoo Fruit-dove (*Ptilinopus magnificus*)
The Wompoo Fruit-dove mainly inhabits large undisturbed patches of tall tropical or subtropical evergreen rainforest. It is an obligate frugivore, taking fruits of many species of rainforest trees, palms, vines and epiphytes, feeding mostly in the canopy (Higgins & Davies 1996).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Superb Fruit-dove (*Ptilinopus superbus*)
This species inhabits mostly closed forests, occasionally near streams or lakes within rainforest. Breeding most commonly occurs within dense forests. They are a regular autumn and winter migrant to the Hunter, Sydney, Illawarra and South Coast regions. This species is frugivorous, taking fruits of many species of rainforest trees, vines and palms (Higgins & Davies 1996).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Black-necked Stork (*Ephippiorhynchus asiaticus*)
This species prefers still and permanent, shallow freshwater floodplain habitats including wetlands, swamps, watercourses, farm dams and shallow floodwaters and adjacent areas of grasslands, heathlands, paddocks, and woodlands. This species also forages around estuaries and along intertidal shorelines (Marchant & Higgins 1990).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Square-tailed Kite (*Lophoictinia isura*)
The Square-tailed Kite inhabits the coastal forested and wooded lands of tropical and temperate Australia. The Square-tailed Kite is a specialist hunter of passerines, especially honeyeaters, and insects in the tree canopy, picking most prey items from the outer foliage (Marchant & Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Eagle (*Hieraaetus morphnoides*)
This species forages in a variety of habitats including woodland open forest, partially cleared areas, along watercourses and around wetlands, avoiding large areas of dense forest. This species nests in mature living trees in open forest, woodland and remnant areas including farmland and areas close to urban development (Marchant and Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern Osprey (*Pandion cristatus*)
The Eastern Osprey is generally found in association with waterbodies including coastal waters, inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers. Osprey may nest on the ground on sea cliffs or in trees. Osprey generally prefer emergent trees, often dead or partly dead with a broken off crown (Olsen 1995).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Bush Stone-curlew (*Burhinus grallarius*)
The Bush Stone-curlew occurs in open woodland with fallen branches, leaf-litter, sparse grass, timber along dry watercourses, sand plains with spinifex and mallee, sandy scrub near beaches, mangrove-fringes, country golf courses, timber remnants on roadsides, plantations and urban areas (Marchant and Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Gang-gang Cockatoo (*Callocephalon fimbriatum*)
The Gang-gang Cockatoo is associated with a variety of woodland and forest habitats, and occasionally more open areas in south–eastern New South Wales and Victoria. This species utilises eucalypt forests and exotic trees, and is known to feed on the seeds of native shrubs and trees, in addition to some exotic species such as the Hawthorn and Cupressus species (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
The Glossy Black-Cockatoo inhabits woodlands and open sclerophyll forests dominated by or with a middle stratum of Allocasuarina. They choose trees with larger cone crops, concentrating foraging in trees with a high ratio of total seed weight to cone weight. They breed in hollow trees or stumps usually in Eucalypts (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Swift Parrot (*Lathamus discolor*)
This species feeds mainly on nectar and lerp from eucalypt flowers, particularly Blue Gum (Eucalyptus globulus). On the mainland, the Swift Parrot congregates where winter flowering species such as Yellow Gum, Red Ironbark, Mugga Ironbark, Box Gums and Swamp Gum. This species also occurs within Blackbutt, Forest Red Gum, Swamp Mahogany and Spotted Gum dominated communities along the coast. The Swift Parrot is a migratory species that breeds in Tasmania and its offshore islands in summer. In late March almost the entire population migrates to mainland Australia spreading from Victoria through to central and coastal NSW and south east Queensland (Saunders and Tzaros 2011).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Lorikeet (*Glossopsitta pusilla*)
Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including, melaleucas and mistletoes (Courtney & Debus 2006).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Barking Owl (*Ninox connivens*)
The Barking Owl utilises dry sclerophyll forests and woodlands of tropical, temperate and semi-arid zones, particularly those associated with watercourses, wetlands and forest edges. Nests in large hollows in live eucalypts, often near open country (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Powerful Owl (*Ninox strenua*)
The Powerful Owl breeds in open or closed sclerophyll forests and woodlands, including wet sclerophyll forest and dry sclerophyll forest and woodlands. They nest in hollows in large old trees; usually living Eucalyptus, within or below canopy in stumps or broken-off trunks. Powerful Owls are sedentary within home ranges of about 1,000 hectares within open eucalypt, casuarina or Callitris pine forest and woodlands, though they often roost in denser vegetation, including rainforest or exotic pine plantations. Powerful Owls feed mainly on medium-sized arboreal marsupials (Higgins 1999).
It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Masked Owl (*Tyto novaehollandiae*)
The Masked Owl is widespread through forests and woodlands. The Masked Owl is known to utilise forest margins and isolated stands of trees within agricultural land. This species is often found in heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained. The Masked Owl is dependent upon hollow bearing trees all year round requiring old mature trees with large hollows for breeding and as diurnal roosting sites (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Regent Honeyeater (*Xanthomyza phrygia*)
The Regent Honeyeater inhabits mostly dry eucalypt woodlands and forests dominated by box ironbark eucalypts; on inland slopes of Great Divide, especially associations in moister more fertile sites, along creeks, broad river valleys and on lower slopes of foothills. Nectar is the principle food but sugary exudates from insects are also used. The Regent Honeyeater is known to breed along the western Slopes of the Great Dividing Range in New South Wales (Higgins et al., 2001).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that

the action proposed is not 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.

Varied Sittella (*Daphoenositta chrysoptera*)
This species inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (Higgins & Peter 2002).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern Pygmy Possum (*Cercartetus nanus*)
The Eastern Pygmy-possum is found from rainforest through sclerophyll forest to tree heath. Banksia and myrtaceous shrubs and trees are favoured. Eastern Pygmy-possums usually shelter alone in tree cavities, rotten stumps, holes in the ground, disused bird nests and possum dreys and in vegetation thickets. The home ranges of males, about 0.65 hectares are larger than those of females, about 0.35 hectares and not exclusive with home ranges broadly overlapping. Apart from females with young in the nest, individuals may utilise a number of nest sites within the home range (Turner & Ward 1995).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Yellow-bellied Glider (*Petaurus australis*)
The Yellow-bellied Glider is an arboreal tree-dwelling mammal. The Yellow-bellied Glider is restricted to tall mature eucalypt forests found within high rainfall regions of temperate through to sub-tropical eastern Australia. The bulk of the diet of the Yellow-bellied Glider consists of plant and insect exudates including sap, nectar, honeydew and manna while arthropods and pollen are also eaten. Yellow-bellied Gliders occupy home ranges between 30 and 65 hectares in size (Goldingay & Kavanagh 1991).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Squirrel Glider (*Petaurus norfolcensis*)
The Squirrel Glider inhabits dry sclerophyll forest and woodland nesting in small tree hollows. The presence of mature, hollow-bearing eucalypts is a critical characteristic of habitat occupied by Squirrel Gliders as they are utilised for nesting and breeding (Suckling, 1995).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Long-nosed Potoroo (*Potorus tridactylus*)
The Long-nosed Potoroo occupies a wide range of habitats, from heath to dry and moist hardwood forests. It requires thick groundcover and may be commoner on light sandy soils. Home ranges have been found to vary considerably, from 1.5 to 19 hectares, and may depend upon suitable habitat availability (Seebeck et al., 1989).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern Chestnut Mouse (*Pseudomys gracilicaudatus*)
In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps (NSW OEH 2015).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Grey-headed Flying-fox (*Pteropus poliocephalus*)
Grey-headed Flying-foxes roost in camps during the day, which may contain tens of thousands of individuals, and then disperse to surrounding areas to forage at night. This species inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and urbanised and agricultural areas. Camps are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy. Camps may also be formed in urban parkland areas (Tidemann 1995).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
The Yellow-bellied Sheathtail-bat inhabits a wide variety of habitats from wet and dry sclerophyll forest, to open woodland, shrubland, mallee, grassland and desert. They fly fast and straight usually over the canopy, and lower over open spaces and at forest edges. This species roosts in large tree hollows (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern Freetail Bat (*Mormopterus norfolkensis*)
The Eastern Freetail-bat utilises dry eucalypt forest and woodland on the coastal side of the Great Dividing Range. They show a preference for open spaces in woodland or forest, and are more active in the upper slopes of forest areas rather than in riparian zones. They also forage over large waterways. This species roosts in hollow trees (usually in hollow spouts), under exfoliating bark and in various man-made structures (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Large-eared Pied Bat (*Chalinolobus dwyeri*)
In the Sydney Basin this species is most commonly recorded in areas of high fertility soils in wet sclerophyll forest along the edges of sandstone escarpments. This species is also recorded in dry sclerophyll forest and woodlands, sub-alpine woodland, at the edges of rainforest, Callitris forest and within sandstone outcrop country. Large-eared Pied Bats roost in clusters in fairy martin nests and on the ceilings of caves, crevices in cliffs and mines in twilight areas (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
The Eastern False Pipistrelle inhabits wet sclerophyll forest, open forest, rainforest and coastal mallee. They generally prefer tall and wet forests where the trees are more than 20 metres high and the understorey is dense. This species predominantly roosts in hollow trunks of eucalypts, however have also been reported to roost in caves and old buildings (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Bentwing-bat (*Miniopterus australis*)
The Little Bentwing-bat forages below the canopy within well-timbered areas including rainforest, vine thicket, wet and dry melaleuca swamps and coastal forests. This species is a cave dweller with individuals congregating during the summer months in maternity colonies and disperse during the winter. Other roost sites used by this species include abandoned mines, tunnels, stormwater drains and occasionally in buildings, banana trees and tree hollows (Churchill 2008).

This species was recorded within the subject site during ultrasonic call recording surveys. No colony roost sites for this species have been observed within the subject site and it is considered that:

- The proposal is likely to result in the removal of approximately 0.22 hectares of forested habitats for the proposed development and further modification of approximately 0.25 hectares of habitats for APZs.

- The proposal is unlikely to result in direct harm to this species due to this species mobility;

- This species is likely to utilise the extensive areas of foraging habitats present within the local area and may from time to time forage within the subject site; and

- The overall areas of available habitat for the local population of this species are not likely to be significantly reduced by the proposal.

It is therefore considered that the proposed development is not 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.

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
Preferred habitats for this species include rainforest, wet and dry sclerophyll forest, open woodland, Melaleuca forests and open grassland. The Eastern Bentwing-bat forages high in forested areas from just above canopy height to many times canopy height. In more open areas such as grasslands, flight may be within a few metres of the ground. Eastern Bentwing-bats are cave dwellers, but will also roost in man-made structures such as road culverts and mines (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Southern Myotis (*Myotis macropus*)
The Large-footed Myotis has a strong association with streams and permanent waterways, most commonly within vegetated areas at lower elevations and in flat undulating country. This species forages over water for small insects, fish and invertebrates and have a preference for large pools rather than flowing streams. Roost habitats for this species are near water and include caves, tree hollows, abandoned fairy martin nests, among

vegetation, in clumps of Pandanus, and man-made structures including under bridges, in mines, tunnels, road culverts and stormwater drains (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Greater Broad-nosed Bat (*Scoteanax rueppellii*)
A wide variety of habitats are utilised by this species including moist gullies in mature coastal forest, rainforest, open woodland, Melaleuca swamp woodland, wet and dry sclerophyll forest, cleared areas with remnant trees and tree-lined creeks in open areas. The Greater Broad-nosed Bat forages about 5m from the edge of isolated trees, forest remnants or along forest crowns with a slow direct flight pattern. This species is known to roost in tree hollows, cracks and fissures in trunks and dead branches, under exfoliating bark, as well as in man-made structures including roofs of old buildings (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No flora or fauna specimens belonging to any endangered population were observed within the subject site. Therefore the proposed action will not have an adverse effect on the life cycle of any species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

c) In the case of a critically endangered or endangered ecological community, whether the action proposed:

i. 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

The following endangered ecological communities were observed within the subject site during surveys:

- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (CS);
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (SOFF);
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (SSFCF).

Coastal Saltmarsh EEC
The CS EEC is represented by a small patch of characteristic saltmarsh vegetation present within the Estuarine Mangrove Scrub vegetation type mapped in Figure 2.1. This EEC does not correspond to the full extent of this vegetation type. All areas of the CS EEC will be retained.

It is therefore considered that the proposed action is not likely to have an adverse effect on the extent of the CS EEC such that its local occurrence is likely to be placed at risk of extinction.

Swamp Oak Floodplain Forest EEC

The SOFF EEC corresponds to the Swamp Oak Sedge Forest vegetation type mapped within Figure 2.1 and approximately 0.32 hectares within the site. The following considerations are provided:

The proposed development will result in the removal of approximately 0.02 hectares of Swamp Oak Floodplain Forest for the proposed 4WD bushfire tanker access to the rear of the development area;

The majority of the SOFF EEC present within the site will be retained (0.3 ha);

It is therefore considered that the proposed action is not likely to have an adverse effect on the extent of the SOFF EEC such that its local occurrence is likely to be placed at risk of extinction.

Swamp Sclerophyll Forest on Coastal Floodplain EEC
The SSFCF EEC corresponds to the Disturbed Swamp Sclerophyll Forest vegetation type mapped in Figure 2.1 and occupies approximately 0.65 hectares of the site. The following considerations are provided:

- The proposed development will result in the modification of 0.05 hectares of the SSFCF EEC for the proposed asset protection zone.
- The area of proposed modification is heavily weed infested and modification works are likely to be limited to under scrubbing of weedy understorey vegetation.
- The overall extent of this EEC is not likely to be substantially reduced as mature SSFCF EEC trees within the APZs will be retained.
- All other remaining areas of the SSFCF EEC within the site will also be retained (0.6 ha).

It is therefore considered that the proposed action is not likely to have an adverse effect on the extent of the SSFCF EEC such that its local occurrence is likely to be placed at risk of extinction.

ii. Is likely to substantially and adversely modify the composition such that its local occurrence is likely to be placed at risk of extinction,

Coastal Saltmarsh EEC
The CS EEC is represented by a small patch of characteristic saltmarsh vegetation present within the Estuarine Mangrove Scrub vegetation type mapped in Figure 2.1. This EEC does not correspond to the full extent of this vegetation type. All areas of the CS EEC will be retained.

It is therefore considered that the proposed action is not likely substantially and adversely modify the composition of the CS EEC such that its local occurrence is likely to be placed at risk of extinction.

Swamp Oak Floodplain Forest EEC
The SOFF EEC corresponds to the Swamp Oak Sedge Forest vegetation type mapped within Figure 2.1 and occupies approximately 0.32 hectares within the site. The following considerations are provided:

The proposed development will result in the removal of approximately 0.02 hectares of Swamp Oak Floodplain Forest for the proposed 4WD bushfire tanker access to the rear of the development area;

The majority of the SOFF EEC present (0.3 ha) will be retained;

It is therefore considered that the proposed action is not likely substantially and adversely modify the composition of the SOFF EEC such that its local occurrence is likely to be placed at risk of extinction.

Swamp Sclerophyll Forest on Coastal Floodplain EEC
The SSFCF EEC corresponds to the Disturbed Swamp Sclerophyll Forest vegetation type mapped in Figure 2.1 and occupies approximately 0.65 hectares of the site. The following considerations are provided:

- The proposed development will result in the modification of 0.05 hectares of the SSFCF EEC for the proposed asset protection zone.
- The area of proposed modification is heavily weed infested and modification works are likely to be limited to under scrubbing of weedy understorey vegetation.
- The overall composition of this EEC is not likely to be substantially affected as mature SSFCF EEC trees within the APZ and all other areas of SSFCF EEC within the site 0.6 ha) will be retained.

It is therefore considered that the proposed action is not likely substantially and adversely modify the composition of the SOFF EEC such that its local occurrence is likely to be placed at risk of extinction.

d) In relation to the habitat of threatened species, populations or ecological community:

i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The areas of proposed habitat removal, modification and retention are provided in Table A1.1.

TABLE A1.1
AREAS OF PROPOSED HABITAT REMOVAL AND MODIFICATION

Vegetation Types Identified in Figure 2.1	Proposed Removal	Proposed Modification	Proposed Retention
Disturbed Moist Forest	0.2	0.2	0.2
Disturbed Swamp Sclerophyll Forest	-	0.05	0.6
Swamp Oak Sedge Forest	0.02	-	0.3
Estuarine Mangrove Scrub	-	-	0.1
Total Site Area	0.22	0.25	1.2

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The existing connectivity between the site and adjoining areas is described as follows:

North
The site adjoins Avoca Drive and a school development to the north. It is considered that no vegetation connectivity is present between the site and areas of natural habitats to this aspect.

East
The site directly adjoins the Davistown Road Bushland Reserve to the east.

South
The site directly adjoins the Davistown Road Bushland Reserve to the south.

West

The site adjoins areas of bushland within two rural-residential allotments to the west.

The proposed development area of the site contains existing buildings and highly disturbed habitats with poor connectivity for local biodiversity. The higher quality habitats within the southern section of the site contain suitable connectivity between areas east and west of the site are proposed to be retained. The current level of connectivity between the site and areas to the south is also likely to be retained.

It is therefore considered that the proposal is not likely to to result in an area of habitat becoming fragmented or isolated from other areas of habitat.

iii. 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

With regard to the habitats to be impacted, the following considerations are provided:

- The proposed development area is highly disturbed;
- The subject site does not provide known habitat for locally occurring threatened flora species;
- The site provides suitable habitats for nomadic locally occurring threatened fauna species capable of utilising disturbed and modified environments as part of a larger home range;
- The site does not provide suitable habitat for a threatened population;
- The proposed development will required the modification and removal of only very small areas of EEC vegetation.
- Due to the position of the site in the context of the surrounding landscape it is considered that the habitats to be removed and modified do not provide an important linkage for threatened species, populations of ecological communities;

It is therefore concluded that the habitats within the site are not likely to be of significant importance to the long-term survival of the threatened species, populations or ecological community within the locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

The subject site has not been classed as critical habitat within the provisions of the *Threatened Species Conservation Act* (1995). Therefore it is considered that the proposed development will not have an adverse effect on critical habitat either directly or indirectly.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Recovery Plans
Recovery plans have been prepared for the following species within suitable habitat present within the subject site:

- Green and Golden Bell Frog;
- Bush Stone-curlew;
- Barking Owl;
- Powerful Owl, Masked Owl and Sooty Owl (Large Forest Owls Recovery Plan);
- Swift Parrot;
- Regent Honeyeater;
- Yellow-bellied Glider

- Grey-headed Flying-fox; and
- Large-eared Pied Bat.

Implementation of actions required to meet the objectives listed in the identified recovery plans are primarily the responsibility of public authorities such as the NSW OEH and Local Government. It is considered that the proposed development is not likely to obstruct the implementation of the identified recovery objectives. The proposal is therefore considered to be not inconsistent with the objectives or actions of the identified recovery plans.

Threat Abatement Plans

The following threat abatement plans have been prepared by the NSW OEH.

- Bitou Bush and Boneseed Threat Abatement Plan
- Predation by the Red Fox (*Vulpes vulpes*) Threat Abatement Plan
- Predation by *Gambusia holbrooki* (plague minnow) Threat Abatement Plan

The proposal is considered to be not inconsistent with the objectives or actions identified within these plans.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

An assessment of the likely impact of the proposal on Key Threatening Processes is provided in Table A1.2.

TABLE A1.2 ASSESSMENT OF KEY THREATENING PROCESSES			
Key Threatening Processes Listed under the *TSC Act* (1995)	**Likely to Occur as a Result of the Proposal**	**Impact or Occurrence Likely to be Mitigated or Reduced as a Result of the Proposal**	**Comments**
Alteration of habitat following subsidence due to longwall mining	No	No	-
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	No	No	-
Anthropogenic climate change	No	No	-
Bushrock removal	No	No	-
Clearing of native vegetation	Yes	No	-
Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)	No	No	-
Competition and habitat degradation by feral goats (*Capra hircus*)	No	No	-
Competition from feral honey bees (*Apis mellifera*)	No	No	-
Death or injury to marine species following capture in shark control programs on ocean beaches	No	No	-
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	No	No	-
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners	No	No	-
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	No	No	-
Herbivory and environmental degradation caused by feral deer	No	No	-
Importation of red imported fire ants (*Solenopsis invicta*)	No	No	-
Infection by psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations	No	No	-
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	No	No	-
Infection of native plants by *Phytophthora cinnamomi*	No	No	-
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	No	No	-
Introduction of the large earth bumblebee (*Bombus terrestris*)	No	No	-
Invasion and establishment of exotic vines and scramblers	No	No	-
Invasion and establishment of Scotch broom (*Cytisus scoparius*)	No	No	-

TABLE A1.2 ASSESSMENT OF KEY THREATENING PROCESSES			
Key Threatening Processes Listed under the *TSC Act* (1995)	**Likely to Occur as a Result of the Proposal**	**Impact or Occurrence Likely to be Mitigated or Reduced as a Result of the Proposal**	**Comments**
Invasion and establishment of the cane toad (*Bufo marinus*)	No	No	-
Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidata*	No	No	-
Invasion, establishment and spread of *Lantana camara*	No	No	-
Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed)	No	No	-
Invasion of native plant communities by exotic perennial grasses	No	No	-
Invasion of the yellow crazy ant (*Anoplolepis gracilipes* (Fr. Smith)) into NSW	No	No	-
Loss of hollow-bearing trees	No	No	-
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	No	No	-
Loss or degradation (or both) of sites used for hill-topping by butterflies	No	No	-
Predation and hybridisation of feral dogs (*Canis lupus familiaris*)	No	No	-
Predation by the European red fox (*Vulpes vulpes*)	No	No	-
Predation by the feral cat (*Felis catus*)	No	No	-
Predation by *Gambusia holbrooki* (plague minnow or mosquito fish)	No	No	-
Predation by the ship rat (*Rattus rattus*) on Lord Howe Island	No	No	-
Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)	No	No	-
Removal of dead wood and dead trees	Yes	No	-

The proposal is likely to increase the impact of the key threatening processes 'Clearing of native vegetation', and 'Removal of dead wood and dead trees'. It is considered that the proposal is unlikely to increase the operation of this key threatening process to the extent that a significant effect on threatened biodiversity will occur.

A1.2 ASSESSMENT OF SIGNIFICANCE (7-PART TEST) CONCLUSION

Based on the details provided in the accompanying report, ecological surveys completed and assessment undertaken above it is concluded that:

i. The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats; and

ii. A Species Impact Statement is not required for the proposed development.

APPENDIX 2

WEATHER CONDITIONS DURING THE SURVEY PERIOD

The following weather recordings from the nearest BOM weather station are provided for the survey period.

Gosford, New South Wales
October 2015 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th	13.4	25.3	0			ENE	28	14:56	19.4	77		S	6		23.5	66		ENE	17	
2	Fr	14.9	24.0	0.2			ENE	26	13:52	21.9	54		SE	7		21.2	58		E	13	
3	Sa	11.1	31.9	0			W	22	11:48	23.8	61		N	7		28.4	48		E	15	
4	Su	14.5	34.4	0			WSW	48	13:49	25.4	37		NNE	6		33.9	11		WSW	28	
5	Mo	11.2	35.8	0			NE	22	14:43	21.7	59			Calm		35.7	11		SSE	6	
6	Tu	13.2	34.7	0			ENE	31	15:20	23.8	50			Calm		33.3	29		ENE	13	
7	We	13.9	19.8	0			S	59	05:48	19.6	73		S	28		18.3	70		SSE	11	
8	Th	15.4	20.1	0			E	30	12:20	18.4	64		ESE	9		19.1	61		ENE	13	
9	Fr	15.1	22.8	0.4			E	31	13:41	19.1	58		NNE	9		22.0	63		ENE	17	
10	Sa	12.8	25.9	0			ENE	24	14:12	20.1	75		ENE	2		23.5	60		ENE	17	
11	Su	11.5	25.9	0			W	43	17:16	19.1	79			Calm		23.9	60		E	13	
12	Mo	13.8	30.4	5.8			ESE	31	13:02	21.6	64		ESE	4		25.1	60		ESE	17	
13	Tu	18.3	20.6	2.4			S	26	23:10	20.6	78		SE	11		20.0	80		E	11	
14	We	14.3	23.7	1.4			NNE	30	21:27	18.2	92			Calm		22.4	64		NE	15	
15	Th	13.4	25.3	0.2			NE	30	14:35	19.7	77		NE	7		24.4	65		ENE	19	
16	Fr	14.9	30.9	0			ESE	24	13:22	22.4	75		ENE	7		29.1	53		E	15	
17	Sa	15.4	25.4	0			SSW	26	21:31	20.4	83		S	15		24.4	60		SSE	9	
18	Su	18.7	22.0	0.2			SSE	24	10:35	19.5	78		SE	11		21.3	67		E	11	
19	Mo	18.2		0.2						20.6	81		NNW	6							
Statistics for the first 19 days of October 2015																					
	Mean	14.4	26.6							20.8	69			7		25.0	54			14	
	Lowest	11.1	19.8							18.2	37			Calm		18.3	11		SSE	6	
	Highest	18.7	35.8	5.8			S	59		25.4	92		S	28		35.7	80		WSW	28	
	Total			10.8																	

Observations were drawn from Gosford AWS (station 061425)

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