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Ecological Assessment; Rezoning and Subdivision Lot 2 DP 270325, 20 Tylers Road, Bargo

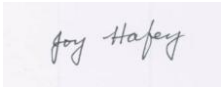
June 2018

CERTIFICATION

Fauna and Flora Assessment: Lot 2 DP 270325, 20Tylers Road, Bargo

Prepared by :-
Name : Joy Hafey
Qualifications : B.Sc. Ecology & Molecular Biology
&
Deborah Fabrizzio
Qualifications:B.Sc. Environmental Science

I hereby certify that I have prepared the contents of this assessment
And to the best of my knowledge, it is true in all material particulars
And does not, by its presentation or omission of information, materially mislead



Signature……..
Name…Joy Hafey……
Date…4 th June 2018……..

Executive Summary

Joy Hafey was engaged by L. and R. Projects Pty Ltd to conduct an ecological assessment for a Development Application on Lot 2 DP 270325 , 20 Tylers Road, Bargo. The DA is for the rezoning of an area from SP2 to R5 and the subdivision of that section of the site into 6 lots. The survey was undertaken to identify fauna and flora on the site and to identify constraints to such development on the site. The site is located in the Wollondilly LGA.

A literature review found that the vegetation on site has been mapped by NSW NPWS Vegetation Communities Map and Tozer et al 2010 as containing Shale Sandstone Transition Forest (SSTF), a Critically Endangered Ecological Community listed under the Biodiversity Conservation Act 2016 and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999.

NSW OEH Wildlife Atlas listed 41 threatened fauna and 35 threatened flora as occurring within 10km of the subject site.

The flora and fauna survey, conducted in autumn- winter and subsequent analysis of the results, indicated that the site contains a small remnant of the SSTF in the north western corner. While trees characteristic of this community are widely spread over the degraded subject site, it is considered that SSTF no longer occurs over the majority of the site.

The survey noted 138 flora species (97native) and 34 fauna species. The threatened species, *Persoonia bargoensis*, *Persoonia glaucescens*, *Grevillea parviflora ssp parviflora* and *Melaleuca deaneii* occurs on adjacent lots (Hafey, 2015), however they are unlikely to occur on the degraded SP2 section of the site. *Phascolarctos cinereus (Koala)* is known to pass through the local area, and as Koala food trees are present on the site, the site is **Potential Koala Habitat**.

Assessments of Significance were undertaken to look at the impact development would have on the SSTF and threatened species occurring or possibly occurring on the subject site. It was concluded that any proposed development, guided by consideration of environmentally sustainable principles, would not have a significant effect on the CEEC of SSTF or the threatened species.

Ameliorating measures recommended to minimise potential impacts of any proposed development, in line with environmentally sustainable principles, were as follows:

- Development must be restricted to large lot zoning.
- A positive covenant to conserve and enhance the remnant CEEC on site and revegetation of the riparian area with SSTF species
- Removal of noxious and environmental weeds
- The boundary fencing and any internal fencing to be constructed in line with environmentally friendly fencing.

It is considered that a proposed development, taking into account constraints and the above ameliorating measures would be considered environmentally sustainable development.
A Species Impact Statement or a referral to the federal minister is not recommended.

List of Abbreviations and Acronyms

ASL	Above Sea Level
BC Act	Biodiversity Conservation Act 2016
CEEC	Critically Endangered Ecological Community
CMP	Conservation Management Plan
DCP	Development Control Plan
DECCW NSW	Department of Environment, Climate Change and Water NSW
DG	Director General
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA Act	EP&A Act Environmental Planning and Assessment Act 1979
EP&A Reg	Environmental Planning and Assessment Regulation 2000
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EPI	Environmental Planning Instrument
LEP	Local Environmental Plan
NES	National Environmental Significance
NPW Act	National Parks and Wildlife Act 1974
NP&W Reg	National Parks and Wildlife Regulation 2009
NPWS	National Parks & Wildlife Service
NW Act	Noxious Weed Act1993
REP	Regional Environmental Plan
RF Act	Rural Fires Act 1994
ROTAP	Rare or Threatened Australian Plants
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
SSTF	Shale Sandstone Transition Forest
TSC Act	Threatened Species Conservation Act 1995
WLEP	Wollondilly Local Environment Plan 2011
WONS	Weed of National Significance

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1.0 Introduction

Joy Hafey was engaged by L. and R. Projects Pty Ltd to undertake an ecological assessment on SP2 zoned section of Lot 2 DP 270325, 20 Tylers Road, Bargo as part of a development application, see Figures1a and 1b. The DA is for the rezoning of part of the Lot 2, from SP2 to R5 and a subsequent 6 lot subdivision, see Figure 2. For the purpose of this report the SP2 section of Lot 2 is referred to as the subject site.

The aim of the flora and fauna study is to:

1. Identify the flora and fauna on the study site, with special emphasis placed on the identification of threatened species. By definition of the Biodiversity Conservation Act (2016) the terms:

    - ***threatened species*** means a critically endangered species, an endangered species or a vulnerable species listed in Schedule 1 of the Biodiversity Conservation Act.
    - ***threatened ecological community*** means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the Biodiversity Conservation Act.

    Appendix 1 lists threatened species, noted as occurring within 10km of the subject site.

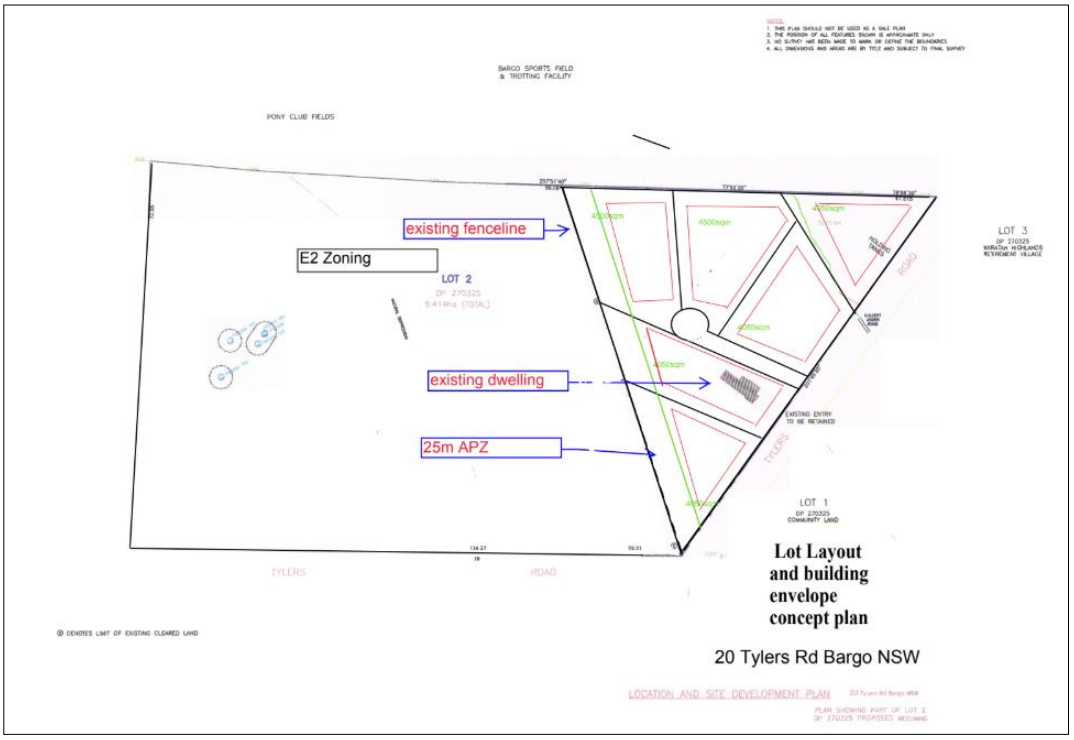
2. Identify habitat potential of the site and identify areas of high conservation significance that could be managed for biodiversity conservation. Identify the wildlife corridor potential of the site.
3. Ascertain any constraints which may restrict development of the subject site. Identify mitigating measures to ameliorate any impacts likely to occur as a result of the proposed development.

4. Identify issues relating to: the Biodiversity Conservation Act (BC Act 2016), Environmental Planning & Assessment Act (EP&A Act 1979), Environment Protection and Biodiversity Conservation Act 1999 (EPCB Act), Biosecurity Act, 2015, Wollondilly Shire LEP 2011 and State Environment Planning Policy 44 (SEPP44) Potential Koala Habitat.

◄**Figure 1a Lot 2 DP 270325**: The site is predominantly comprised of bushland with a triangular section of grassland and scattered trees to the east

▲**Figure 1b Detail of the SP2 Area:** The rezoning area is highlighted by the orange transparency. It covers an area of approximately 2.8ha and is comprised predominantly of open grassland with scattered trees. Reference NearMap.

▼**Figure 2 Proposed Six Lot Subdivision of the Subject Site:** The concept plan allows for six large lots varying in size from 4500m² to 4050m². Access is from a cul-de-sac off Tylers Road and directly from Tylers Road. A 25m bushfire Asset Protection Zone parallels the western boundary.



2. Description of the Subject Site.

The subject site covers an area of approximately 2.8 ha and is currently zoned, SP2 (Special Purposes Infrastructure). The SP2 section was utilised as a Sewerage Treatment Plant (STP) for the retirement village directly to the east, see Figure 2. The treated waste water was pumped out onto the paddocks. With the connection of the Bargo village to the town sewerage system, the plant became redundant and the STP has been decommissioned for many years. This area of the subject site is cleared with scattered trees. Native plantings surround the decommissioned buildings.

Since the decommissioning of the sewerage works a dwelling has been constructed adjacent to Tylers Road.

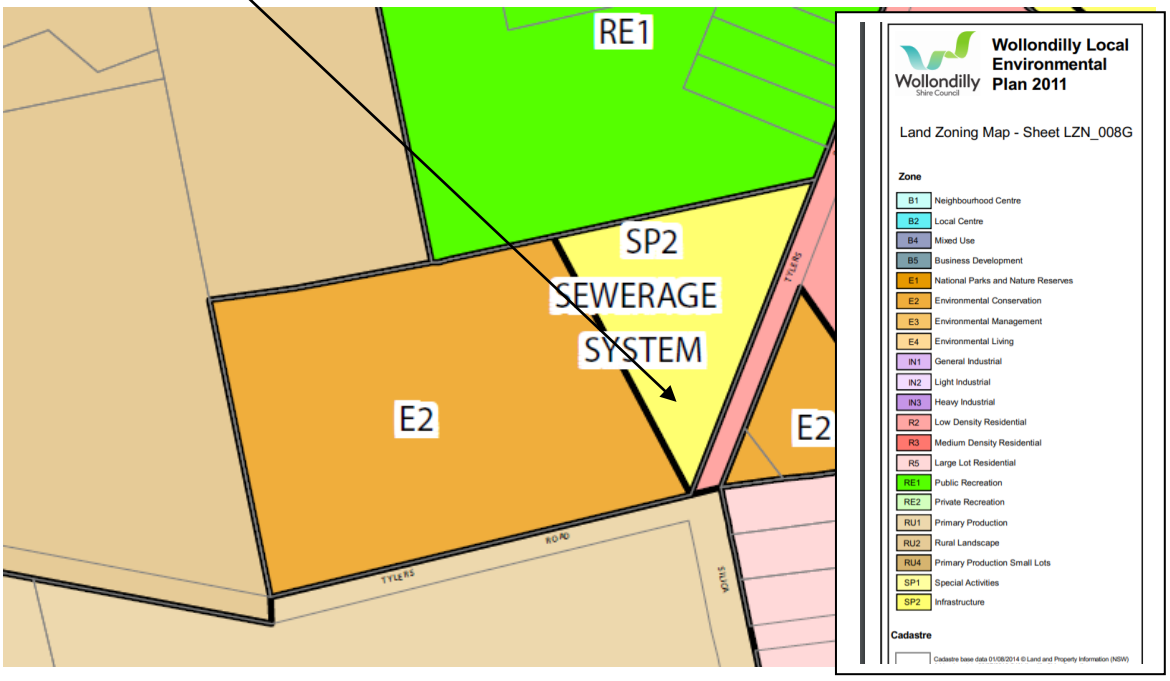
The subject site is zoned SP2 (Special Purposes), see Figure 3.

2.2 Location – The subject site is located approximately 100 km south west of Sydney CBD in the Wollondilly LGA and approximately 1 km south of Bargo PO (Figure 4). It is bounded by Tylers Road to the east and

south, Bargo sportsground and raceway to the north and bushland to the west.

2.3 Landform- the subject site is relatively flat with altitude at 340 metres AS.L There is a gentle slope to the north west to a tributary of Hornes Creek.
When the sewerage treatment was operational, a.small bund directed nutrient rich water flow from the SSTF area, see Plate 1.

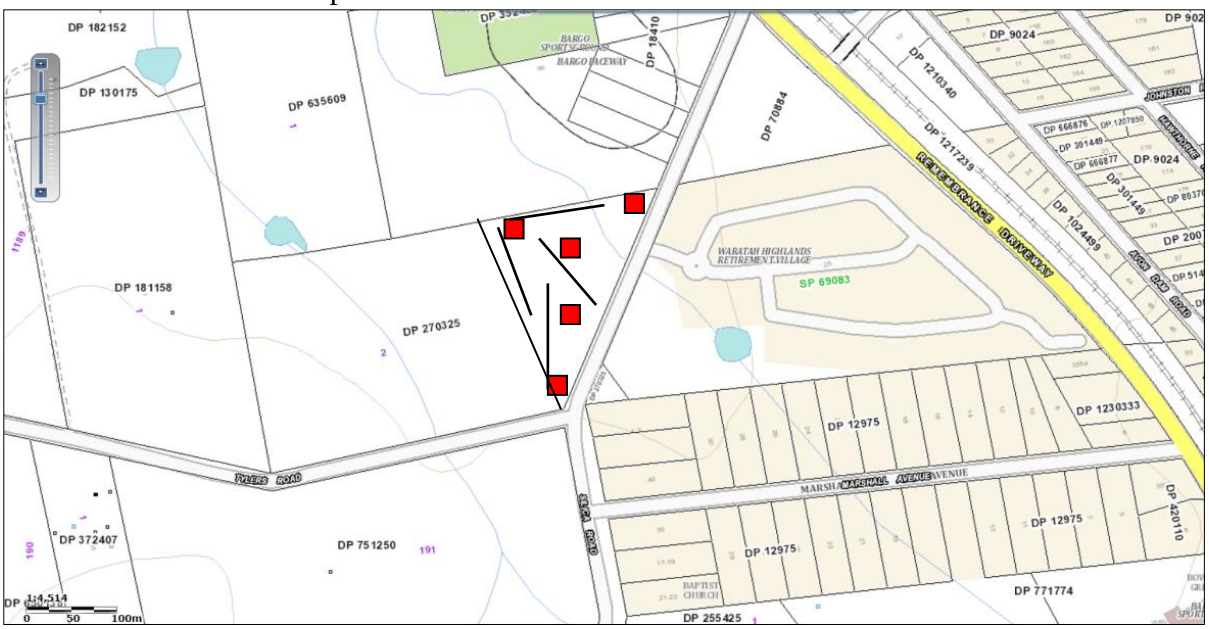
▼**Figure 3: The Proposed Development Site, Zoning and Location:** The subject site (SP2 land) is located on the perimeter of the residential land in the village of Bargo. Lot 2 has split zoning. Land to the east is zoned SP2 (Infrastructure), land in the centre and to the west is zoned E2 (Environmental Conservation).



(Reference Wollondilly Shire Council LEP 2011)

▲Plate 1 Western Section of the SP2 Land: A small bund directs water flow away from the CEEC of the SSTF. The subject site is substantially pasture improved with exotic grasses. SSTF occurs to the west and on a section of the subject site in the north west corner (green highlighted)

▼Figure 4: Topography of Subject Site and Survey Methodology: The site is relatively flat with a slight slope to the north east. Two tributaries of Hornes Ceek cross Lot 2. On the SP2 zoned land, the location of quadrats is indicated in red and trap lines in black Reference Sixmaps



Reference sixmaps

2.4 Soils – are moderately fertile, derived from Wianamatta Shales and underlain by Hawkesbury Sandstone. The soils on site are podsolic with alluvium towards the creek line.

2.4 Climate
The climate of the area is temperate with mild to hot summers and cool to cold winters, frosts are common. The mean annual rainfall for the area is approximately 806 mm per annum. The predominant and strongest winds are from the west.

3.0Methodology
A literature review was carried out to ascertain the conservation significance of plant and animal species, plant communities and animal habitats in and near the subject site.

The field survey was conducted by Joy Hafey, ecologist, over 5 days May 2018, during warm to cold weather. Temperature variation ranged from 12°C to 25°C. An amphibian survey was undertaken after rain.
The degree of disturbance to habitat and threats such as weed invasion and the presence of feral animals were noted.
This survey followed DEC Threatened Biodiversity Survey and Assessment Guidelines for Development and Activities (Working Draft) 2004

3.1 Flora Methodology

The methodology for this study involved detailed field investigation of the study area. Transect lines were walked and the vegetation noted. Subjective visual inspections and assessment of vegetative biodiversity were noted. Random meander method of Cropper 1993 was utilised to target threatened species. Quadrat analysis of areas was undertaken to ascertain plant community identity and the degree of disturbance, see Figure 4
Topographic maps and aerial photographs were used to identify features of the vegetation for investigation during fieldwork.
Vegetative communities are described in terms of dominant plant species and vegetation height and density. Plant taxonomy follows Harden (2002)

3.2 Fauna Methodology
The following methods were employed during the fauna assessment:

Small Ground Animals were surveyed by trapping with Elliott traps, baited with rolled oats/peanut butter and honey. Traps were set in the evening and retrieved the following morning. Any captured animals were

released at the point of capture. A total of 60 trap nights were undertaken. The location of trap lines is indicated by black lines in Figure 4.

Aboreal Animals were sampled by opportunistic sightings on visits to the site. Spotlighting using a hand held halogen globe torch was undertaken over
three nights. The technique involved walking amongst woodland trees and conducting searches of all trees. A total of 2 hours observations were recorded each night. Observations of scats, scratchings, diggings etc, indicating the present of these animals, were noted and recorded.

Amphibians were noted by listening for calls during each visit and by searching in habitat areas, e.g. under timber and rocks. Playback tapes were utilises at night to illicit a response from threatened species, which may have been present on the study site.

Reptiles were sampled by opportunistic sightings and by turning over debris during each visit to the site

Avifauna were sampled by opportunistic sightings and listening for calls during each visit to the site. Playback tapes of owl species were utilised during night visits.

Bats were sampled by opportunistic sightings during night visits to the site.

Large ground animals were sampled by opportunistic sightings on all visits to the site. Observations of scats, scratchings, diggings etc. indicating the presence of these animals, were noted and recorded.

4.0 Flora and Fauna Results.

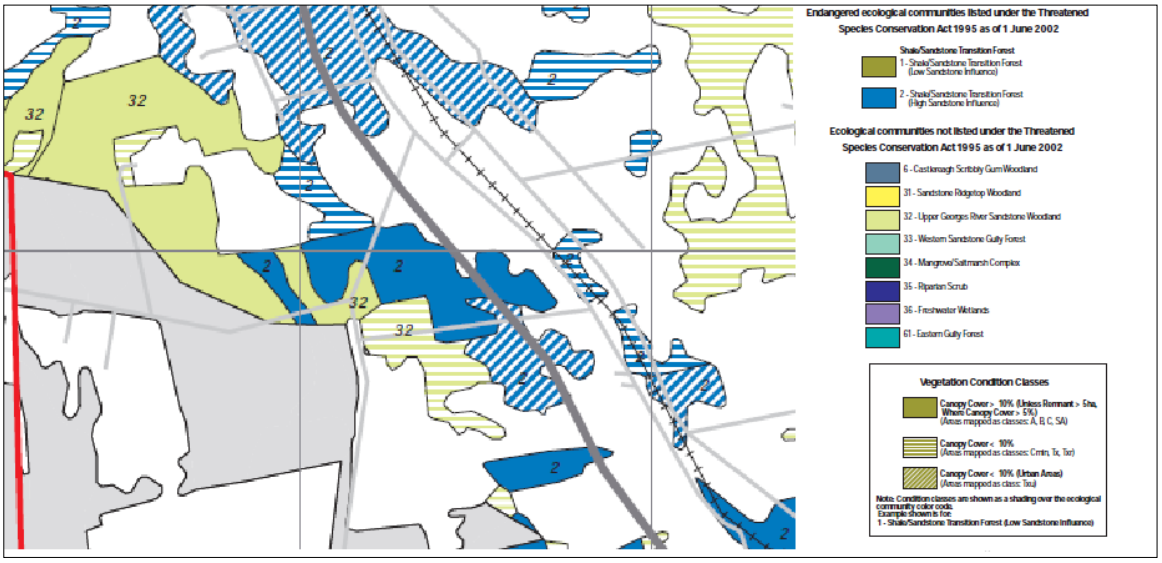
The literature review, conducted to assess the potential diversity and abundance of flora and fauna species in area, included the following:

1 NSW OEH Bionet Atlas 10km from the subject site
2 Australian Museum Records
3 Rare or Threatened Australian Plants (ROTAP)
4 EPBC Protected Matters Report 10km from the subject site

The literature review found the following:

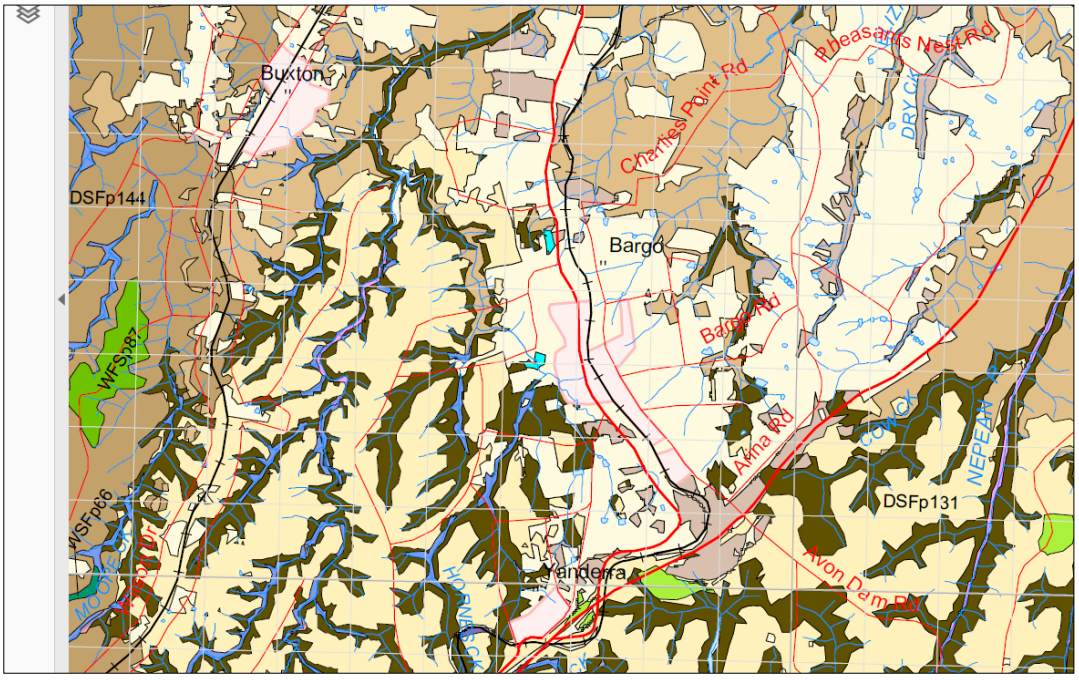
- Threatened fauna and flora identified within 10km of the subject site (Wildlife Atlas and EPBC Protected Matters Search Tool)) are listed in Appendix 1 and the likelihood of occurrence on the site is noted.
- NPWS 2002 identified the site as containing SSTF vegetation, see Figure 5.
- Tozer et al 2010 identified the site as containing SSTF, see Figure 6.
- The literature review found that the vegetation on site has been mapped by NSW NPWS Vegetation Communities Map 2002 and Tozer et al 2010 as containing Shale Sandstone Transition Forest (SSTF), a Critically Endangered Ecological Community listed under the Biodiversity Conservation Act 2016 and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999.

▼Figure 5 Vegetation Communities Map NPWS 2002:



Ref: NPWS (2002) 'Native Vegetation of the Cumberland Plain'

▼Figure 6 Vegetation Communities Map (Tozer et al 2010): The map overlays are slightly out of alignment in this view. It is indicated that cleared land occurs in the vicinity of the subject site and SSTF occurs near the subject site.



WSF p268	Southern Highlands Shale Woodland	Trees: *Eucalyptus cypellocarpa, E. radiata, E. quadrangulata, E. globoidea*. Shrubs: *Leucopogon lanceolatus, Ozothamnus diosmifolius, Persoonia linearis*. Ground Cover: *Hardenbergia violacea, Lomandra longifolia, L. multiflora, Microlaena stipoides var stipoides, Austrostipa rudis ssp nervosa, Dichondra spp, Gonocarpos tetragynus, Pteridium esculentum, Opercularia diphyla.*
Grassy Woodlands		
GW p2	Cumberland Shale Sandstone Transition Forest	Trees: *Eucalyptus crebra, Eucalyptus fibrosa, Allocasuarina littoralis, Eucalyptus punctata*. Shrubs: *Persoonia linearis, Bursaria spinosa, Ozothamnus diosmifolius, Hibbertia aspera*. Climbers: *Glycine clandestina*. Groundcover: *Lepidosperma laterale, Cheilanthes sieberi, Aristida vagans, Pratia purpurascens, Microlaena stipoides, Entolasia stricta, Lomandra multiflora, Themeda australis, Panicum simile, Echinopogon caespitosus, Pomax umbellata, Dichondra spp., Billardiera scandens, Opercularia diphylla.*
p142	Gully Forest	*Platysace linearifolia, Ceratopetalum gummiferum, Acacia ulicifolia, Acacia terminalis*. Climbers: *Billardiera scandens*. Groundcover: *Entolasia stricta, Pteridium esculentum, Dianella caerulea, Smilax glyciphylla, Xanthosia pilosa, Lomandra longifolia, Lepidosperma laterale, Lomandra obliqua.*

4.1 Flora Survey Results

The site provides habitat for 138 flora species, the majority of which were native species (97) and 34 fauna species. Appendix 2 and 3 list species noted. Weed invasion is sparse over the majority of the site with a number of environmental and noxious weeds (Blackberry and African Love Grass) noted in the northern section.

The current survey found the subject site supports three general vegetation communities: These are as follows:

1. **A grassland community with scattered trees**
2. **Shale Sandstone Transition Forest**
3. **Riparian vegetation comprised predominantly of Privet and Blackberry with a small number of eucalypts and paperbarks.**

▼Figure 7 Vegetation Communities and Existing Development (Hafey 2018): The subject site consists of cleared and vegetated areas. The existing dwelling and treatment works are surrounded by compacted driveways, landscaping and parking areas. The hatched area has recently been cleared of Privet and Wattles. SSTF occurs in the north west (green).

Legend

- Cleared Grassland with Scattered Trees
- SSTF
- Developed Areas with buildings etc and landscaping
- Riparian Area

▲Plate 2 Development Area: The existing dwelling is contained within an area of non vegetative land and landscaped gardens.

▲Plate 3 Development Area: The treatment works is significantly ecologically disturbed with constructed buildings, construction materials and etoliated historic landscaping of predominantly Callistemons and Hakeas..

▲Plate 4 Northern Grassland Area: This area was recently cleared of Privet and Wattle regrowth. Native trees have been retained with predominantly exotic grasses.

1.The disturbed grassland community with scattered trees consisting predominantly of exotic grasses and forbs with scattered native trees. It covers the majority of the site as shown in Figure 7. The front cover of this report and Plates 1, 4 and 5 are views of this community. Scattered trees are dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and Eucalyptus tereticornis (Forest Red Gum) approximately 20m in height, with <10% canopy cover. Exotic grasses occurring include, *Pennisetum clandestinum* (Kikuyu), *Paspalum paspaloides* (Paspalum) , *Phalaris minor* and *Cynodon dactylon* (Couch).Native grasses are sparse and include *Themeda australis* (Kangaroo Grass), *Entolasia stricta (*Basket Grass), *Lomandra filiformis ssp filiformis* (Slender Mat Rush) and *Microleana stipoides* (Weeping Grass)

▲Plate 5 View of Grassland Community: This area to the south and west of the existing residence was utilised as the irrigation area when the sewerage treatment works was operational. The site supports scattered trees with a dense ground stratum of exotic grasses.

▲**Plate 6 SSTF:** This community occurs in the south western corner. The SSTF, is open with a grassy ground cover. The shrub and ground cover are sclerophyllic in nature. Juvenile recruitment of trees, shrubs and ground covers of the SSTF community is occurring.

2.Remnant SSTF covers the north western section of the site, see Figure 7 and Plate 6. It covers an area of approximately 0. 14ha.This vegetation is part of the CEEC of the Shale Sandstone Transition Forest
The canopy species of this community includes, *Eucalyptus.punctata* (Grey Gum), *E. crebra* (Narrow-leaved Ironbark), *E.eugenoides (*Thin-leaved Stringybark), and *E.tereticornis* (Forest Red Gum) The canopy species varies in height from 20m to 22m and canopy cover varies between 10-15%.**A sparse lower canopy** is present and consists predominantly of *Acacia decurrens* (Sydney Green WattleWattle) *Allocasuarina littoralis* (Black She Oak) and *Acacia parramattensis* (Parramatta Green Wattle). The lower canopy is approximately 8m in height
The SSTF shrub layer is generally sparse and consists predominantly of *Kunzea ambigua* see Plate 6.
The ground stratum is variable in structure and species composition, There are a range of grasses, forbs and ferns eg *Aristida vagans* (Three-awned Grass), *Microleana stipoides* (Weeping Grass), *Echinopogon ovatus, E.caespitosus* (Hedgehog grass), *Dichondra repens* (Kidney Weed), *Themeda australis*, *Lomandra longifolia* (Mat Rush), *Pterideum esculentum*

(Bracken), *Poa species* and *Hibbertia aspera ssp aspera* (Rough Guinea Flower). **Weed species** within the SSTF has a sparse occurrence.

3. Riparian Vegetation is restricted to a linear area in the north of the site, see Figure 7. It is dominated by *Ligustrum sinense* (Privet) and *Rubus fruiticosa* (Blackberry). *Eucalyptus amplifolia* (Cabbage Gum) provides an emergent canopy with *Acacia parramattensis* in the lower canopy. See Plates 7 and 8.

Weed invasion within the subject site is sparse with the exception of the northern area near the creek line, see Plates 7 and 8. *Eragrostis curvulova* (African Love Grass), a noxious weed, was noted on the roadside reserve and was probably introduced to the site via earth moving equipment.

▲**Plate 7 Weed Invasion in the Northern Corner:** Blackberry and Privet are abundant adjacent to and in the creek line

▲Plate 8 Riparian Vegetation in the Northern Corner: The riparian vegetation is composed predominantly of Privet with an emergent canopy of *Eucalyptus amplifolia. Tradescantia albida* (Wandering Jew) is abundant.in the ground cover.

4.2 Fauna Results

The habitat potential of the site has been limited with the past historic clearing of a substantial area of native vegetation and the introduction of exotic fauna and flora species.

Small animals

- No small animals were trapped in Elliot traps during site visits.

Other larger animals were in evidence on or near the subject site.

- Rabbit (*Oryctolagus cuniculus*) were observed in abundance.
- Dog (*Canus lupisfamiliaris*) was observed.
- Fox scats (*Vulpes vulpes*) were noted.
- A cat (*Felix cattus*) was noted.
- Swamp Wallaby (*Wallaby bicolour*) was observed.

Amphibians heard in the drainage line were the Eastern Froglet (*Crinea signifera)* and Striped Marsh Frog *(Lymnodynasties peronii)* both common species noted to be tolerant of less than pristine conditions.

Reptiles were noted amongst litter, *Lamprophalia guichanoti* (Garden Skinks).

Avifauna, a total of 25 bird species were recorded, by observations or identification of calls on site visits. The birds were native species and included a range of species eg, insectivorous, nectivorous and wetland birds

Note: No threatened fauna species were observed or indicated by signs, as being on the site:

4.3 Discussion of Fauna and Flora Results and Constraints

While the survey was carried out in drought conditions and over a limited period of time the survey results did provide a reasonable ecological assessment of the site.

The following vegetation communities have been identified .on the subject site.

1. **A predominantly exotic grassland community with scattered trees**
2. **A small section (approximately 1400m^2) of Shale Sandstone Transition Forest in the north west corner.**
3. **A small section of degraded riparian vegetation.**

The area, indicated by the green transparency in Figure 7 is considered to be SSTF. While identification of the SSTF in this area, is not well defined by

quadrat analysis and positive diagnostic species, there is sufficient characteristic species to determine that SSTF is present on this part of the subject site. Natural regeneration, following guidelines as set out in the document "Restoring Vegetation Communities on the Cumberland Plain", should be allowed to occur. Weed removal may be required during the regeneration process. A positive covenant would need to be placed on the remnant and regenerated SSTF community. This area has a high ecological value.

The area, indicated by the yellow transparency in Figure 7, is grassland with scattered native trees. The scattered trees are SSTF canopy species. However it is not regarded that SSTF occurs in this area, as the understorey is absent and the ground cover is predominantly exotic grasses. It is unlikely, given the history of the site, that this area contains viable SSTF seed in the soil seed bank. This area has a low ecological value.

Note: The rezoning to R5 would provide sufficient area to retain most trees in the grassland area.

The following assessment of ecological value is provided below.

Areas of high ecological value are mapped for the following characteristics:

- *All vegetation listed as a CEEC or EEC under the BC Act and/or EPBC Act irrespective of condition*.
- *Mapped riparian buffers for 3rd or greater under the Strahler Stream Order classification*.

Areas of moderate ecological value are mapped for the following characteristics:

- *Listed as a Vulnerable Ecological Community under the BC Act and/or the EPBC Act.*
- *Any other remnant non listed native vegetation of any condition.*
- *Mapped riparian buffers for 1st and 2nd order watercourses greater under the Strahler Stream Order classification*.

Areas of low ecological value are mapped for the following characteristics:

- Planted / modified vegetation

Note: Bushland vegetation on site has a high ecological value. The exotic pasture has a low ecological value.

Note: As a class 1 stream, under the Office of Water, a 10m vegetation buffer is required from the top bank of the upper tributary of Hornes Creek which passes through the northern section of the subject site.
This site has ecological connectivity to other areas of bushland to the west

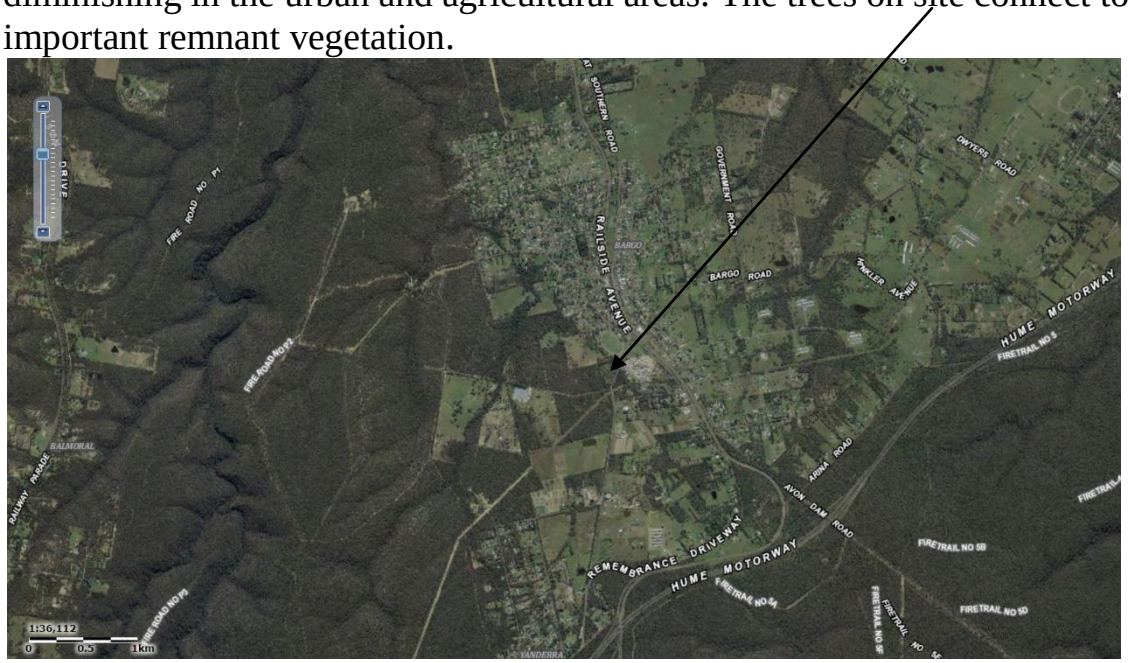
5.0 Habitat and Wildlife Corridor Potential

The site was surveyed for habitat potential to assess the likely occurrence or potential utilisation of the site by native fauna. The survey identified the diversity, structure and health of those habitats observed within the study area.

- The degree of disturbance to the site is significant with previous clearing.
- Under scrubbing of understorey and ground cover has occurred over sections of the site. However regrowth is now occurring and protection of SSTF will see the community and habitat restored.
- There are few significant old growth trees with large hollows present to provide nesting sites for a range of fauna.
- A remnant of SSTF exists in the north western section of the site and provides important habitat in the varied structure and diversity of species within this community. There is a spreading canopy of diverse trees, many with rough bark and some with small hollows, a diversity of flowering and fruiting plants, litter and ground covers.
- There is a small drainage line with an area of swampy land, in the northern section of the site. On a scale of 1 to 3 (1 equates to poor, 2 to moderate and 3 good). it is considered the habitat potential for faunal species on the subject site is 2 or moderate in the SSTF area and 1 or low in the grassland area. Appendix 6 provides a definition of this scale.

Aerial photographs were used in conjunction with cadastral maps at a 1: 25 000 scale to give an indication of the overall extent of native vegetation on the site and its continuity with other areas of native vegetation in the area Habitat fragmentation has been occurring over a long period of time in the local area as a result of anthropogenic change eg land clearance for agriculture, forestry and urban development. Wildlife corridors are therefore not continuous throughout the area. However remnant vegetation on site connects loosely to the important wildlife corridor of the Nepean River (Figure 8) and the larger areas of bushland eg Blue Mts World Heritage Area, Nattai National Park, Bargo River State Conservation Reserve, to the west and south and the protected Water NSW land to the east

▼**Figure 8 Wildlife Corridor Potential:** Remnant vegetation is rapidly diminishing in the urban and agricultural areas. The trees on site connect to important remnant vegetation.



6.0 Statutory Assessments

A number of statutory assessments are required to be considered. They are as follows:

The Biodiversity Conservation Act (2016) *is a state legislative requirement that must be addressed in the assessment of fauna and flora matters. It requires consideration of the potential impacts on threatened species, populations and ecological communities.*

There are 35 flora and 41 fauna species, listed under the BC Act, occurring within the local area that need to be considered. These are addressed in Appendix 1 and the likelihood of occurrence addressed.
Remnants of the CEEC of the SSTF were identified on the subject site. An Assessments of Significance ("5 part test") is conducted below for this community and threatened species.

Section 5A of the Environmental Planning & Assessment Act (1979) *lists factors to be taken into account in deciding whether there is a significant effect on threatened species as a result of development. These factors are based on the Test of Significance.*

Tests of Significance are undertaken below for threatened species and threatened ecological communities.

State Environment Planning Policy no. 44 (SEPP44)-Koala Habitat Protection.

The aims of this legislation *is "to encourage the conservation and management of natural vegetation that provide habitat for Koalas to ensure a permanent free living population over their present range and reverse the current trend of the koala population decline" . A development application affecting one hectare or more, in an identified local government area, must be assessed under SEPP 44.*

An assessment under this legislation is based upon whether the land constitutes potential Koala habitat.

Potential Koala habitat *is defined as the" number of eucalypt species present in Schedule 2 (table 1) of SEPP 44, constitute 15% or more in the upper and lower stratum of the tree component present on site".*

If potential Koala habitat is present the area must be further assessed to determine if the site constitutes core Koala habitat.

Table 1 schedule 2 Tree Species (Koala feed trees)

Scientific Name	***Common Name***
Eucalyptus albens	*White Box*
Eucalyptus camaldulensis	*River Red Gum*
Eucalyptus haemastoma	*Broad-leaved Scibbly Gum*
Eucalyptus microcorys	*Tallowwood*
Eucalyptus populnea	*Poplar Box*
Eucalyptus punctata	*Grey Gum*
Eucalyptus robusta	*Swamp Mahogony*
Eucalyptus signata	*Scibbly Gum*
Eucalyptus tereticornis	*Forest Red Gum*
Eucalyptus viminalis	*Ribbon Gum*

Core Koala habitat *is defined as "an area of land with a resident population of Koalas as evidenced by attributes such as breeding females (ie females with young) and recent sightings of and historic records of a population".*

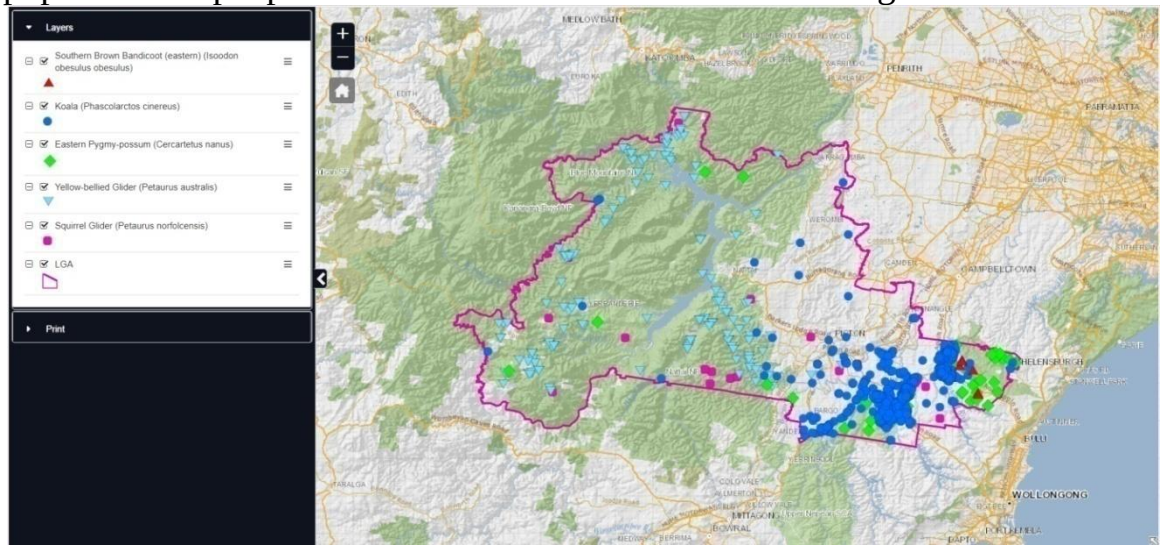
Note: With regard to SEPP 44 this legislation provides an inadequate basis to adequately assess land as potential Koala habitat The list in Schedule 2 is incomplete with regard to what constitutes koala food trees. A more relevant list is included in the Recovery Plan for Koalas, Dept. Environment and Conservation (DEC).

On the basis of SEPP 44 the site does constitute Potential Koala Habitat with two Koala food trees present., *Eucalyptus tereticornis* and *Eucalyptus punctata*. **On the basis of DEC Draft Recovery Plan, the site constitutes Potential Koala Habitat** as the following tree species constitute greater than 15% of the upper and lower canopy of tree species, *E.punctata, E.eugenoides, E.tereticornis, E.sclerophylla* and *E.crebra*

Following guidelines set out by the Australian Koala Foundation 1995, A **Spot Assessment Technique** (SPAT), was carried out to determine if Koalas were active within the study site. Koala pellet (scats) searches were conducted within one meter of the base of koala food trees. These trees were also searched for Koala scratches. 30 Koala food trees were searched. each morning for scratches and scats The locations of these areas were spread all over the site
Results of the survey found no pellets, no scratches and no Koalas were observed.

In conclusion it is unlikely that Koalas are present in the study area given the lack of evidence eg sightings or scats and the cleared rural and residential nature of the surrounding area. Koalas have been recorded from surrounding bushland areas to the north, south, east and west (NPWS 2018) It is likely that they pass through the area from the large bushland areas along the Nepean River, see Figures 8 and 9. The Nepean and Bargo Rivers are important corridors for the movement of Koalas and gene flow.

▼**Figure 9 Recorded Koala Sightings**: Reference Bionet Atlas 2018. The noted occurrence of Koalas in the Wollondilly LGA. The sparse occurrence of Koalas in the west of the shire is a feature of the sparse population of people to record Koalas in this World Heritage Area.



The Fisheries Management Act (1994) *provides a list of threatened aquatic species, which require consideration when addressing the potential impacts of developments.*

There is an absence of suitable habitat for any threatened aquatic fauna or flora within the subject site, therefore this legislation does not need to be addressed.

The Environment Protection and Biodiversity Conservation Act 1999 *is a national statutory requirement that requires that Commonwealth approval be sought for certain developments that may impact upon matters of national environmental significance There are nine matters of national environmental significance under the EPBC Act 1999:These matters are as follows:*

- *World Heritage properties*
- *National Heritage places*
- *Wetlands protected by the Ramsar Convention.*
- *Nationally listed threatened species and ecological communities.*
- *Nationally listed migratory species.*
- *Nuclear actions, including uranium mining.*
- *Great Barrier Reef Marine Park*
- *Protection of water resources from coal seam gas development and large coal mining development*
- *The Commonwealth marine environment*

The site does not contain any Ramsar wetlands, nor is the site involved with nuclear development. The site is not located within the Great Barrier Reef Marine Park, does not pose any potential impacts to the Commonwealth marine environment and is not associated with any coal seam gas development or large coal mining development. There are threatened flora and threatened fauna listed nationally to be considered in the local area, see Appendix 1. The SSTF is listed under the EPBC and is considered below.

7.0 Assessments of Significance Biodiversity Conservation Act & EPBC Act

An assessment of significance allows decision makers to assess whether a proposed development is likely to impact significantly, on a threatened species, its populations, habitats or on a threatened ecological community. The stages of a threatened species assessment are

- preliminary assessment
- assessment of the nature of the development

- evaluation of significance
- administrative and legislative outcomes of the " five part test"

The objective of an **Assessment of Significance,** under section 5A of the Environmental Planning & Assessment Act 1979 (EP&A Act), "is to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats through the planning and assessment process, and to ensure that the consideration is transparent." The five part test applies a number of questions that need to be answered, so that determining and consent authorities may be able to gauge whether a proposed development is likely to have a significant effect on threatened species, populations or ecological communities.
The revised factors (5part test) focus on the original intent of the legislation as well as focusing particularly on the likely impacts to the local environment.

Note: **Endangered (E)** species are defined as "taxa in serious risk of disappearing from the wild state within one or two decades if present land use and other factors continue to operate".

Vulnerable (V) species are defined as taxa not presently endangered but at risk of disappearing from the wild over a longer period (20-25 years) through continued depletion, or which largely occur on sites that are likely to experience changes in land use that would threaten the survival of the species in the wild" (Briggs and Leigh 1995)

Note: Degraded sites may still be regarded as SSTF as defined in the Final Determination. Highly disturbed sites that have "**few if any native species in the understorey are specifically included in the community, provided vegetation, either understorey or overstorey or both, would under appropriate management, respond to assisted natural regeneration, such as where natural soil and associated seed bank are still at least partially intact" (NPWS 2001**). Sites with isolated paddock trees or sites where there is unlikely to be sufficient residue seed in the soil seed bank as a consequence of intensive cropping or continued pasture improvement, are unlikely to be part of the community.

7.1 Shale / Sandstone Transition Forest (S.S.T.F.) Structure & Distribution

S.S.T.F. has been listed as a CEEC under of the BC Act 2016 and the Commonwealth EPBC Act 1999.

This ecological community occurs in areas transitional between clay soils derived from Wianamatta Shales and Hawhesbury Sandstone. " S.S.T.F. generally occurs on soils derived from shallow shale or clay material overlaying sandstone or where shale derived material has washed down over sandstone derived substrate" (N.S.W. Scientific Committee Final Determination.
S.S.T.F. occurs within the Sydney Basin Bioregion and is found in Blacktown, Baulkam Hills, Blue Mountains, Campbelltown Hawkesbury, Liverpool, Penrith and Wollondilly Local Government areas. These occurrences are mainly in the area bounded by Parramatta, Glenorie, Roberts Creek, Kurrajong, Springwood, Oakdale, Buxton, Cateract Dam and Wedderburn (U.B.B.S.1997).
The Final Determination lists all sites as being within the Sydney Basin Bioregion.

S.S.T.F. floristics composition, is a mix of species, found either in shale or sandstone habitats. The community is forest or woodland and characteristic tree species include, *Eucalyptus punctata, E. resinifera,* one or more of the stringybarks, *E. globoidea, E. eugenoides, E. sparsifolia, E.agglomerata,* one or more of the ironbarks, *E. crebra, E.fibrosa, E.paniculata..*

A number of plant species regarded as having national, state or regional conservation significance is found in S.S.T.F. habitat.
It is believed that <10% of the original extent of S.S.T.F. remains and is mainly in the form of small and fragmented stands. It is estimated that S.S.T.F. may become extinct within 20 years if ameliorating steps are not taken to halt development pressures and human impacts.

Threats to S.S.T.F. include activities such as, agriculture, hobby farming, housing, invasion by exotic plants, increased nutrient load, rubbish dumping, slashing and recreational activities.

"Test of Significance" BC Act *2016 SSTF*

SSTF occurs to the west of the subject site and occupies an area of 0.14ha on the subject site.

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The community is not a threatened species. The lifecycle of the individual species that make up this community are already significantly disrupted by

previous land use practices eg clearing, soil removal, soil replacement and weed invasion.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(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

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Any proposed development will not require a significant area to be modified or removed. The area that would be modified or removed is considered to be significantly lacking in biodiversity and has significant weed invasion. The local occurrence of the SSTF community is unlikely to be placed at risk of extinction. Regeneration and removal of invasive noxious and environmental weeds from the land would protect the SSTF in the local area by removing a seed source of invasive weed species. A covenant placed on the SSTF remnant of 0.14ha in the north west corner of the subject site and natural regeneration of this area would reduce the risk of extinction in the local area and improve local biodiversity and SSTF in the area.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,.

The subject site provides an area of approximately 2.8 ha of highly modified habitat with SSTF occurring over approximately 0.14 ha of the total area, see Figure 7. The area for future development has already been modified and fragmented by past clearing events, land forming and weed invasion. This proposed development will not increase this fragmentation as any proposed development would be located adjacent to existing development. The habitat availability will not be altered as a consequence of any proposed development. Any subdivision would require a fence to delineate the boundaries. The construction of an environmentally friendly fence comprised of plain wire with posts and star pickets or post and rail can be achieved without the need for clearing and would be

environmentally friendly. Native fauna would be able to access the subject site.
The footprint of the any development would be outside the area where the SSTF occurs. The local occurrence of this SSTF community is unlikely to be placed at risk of extinction. Regeneration of an area along the north western boundary would protect and enhance the SSTF community on site and in the local area .Limited proposed development that is environmentally sustainable is unlikely to impact on the long-term survival of any species, population or ecological community in the locality.

> *(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

There is no proximal area of outstanding biodiversity value that would be impacted by the proposed development either directly or indirectly.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Future development would see the little destruction of habitat for the community of the SSTF. While clearing does constitute a key threatening process, it is not likely to result in the operation of, or increase the impact of, any key threatening process within the SSTF area. The proposed development would occur in an area that has been substantially cleared and outside the area where SSTF is considered to occur. An earth bund has previously been constructed, Plate 1, to keep any nutrient increase from the SSTF community. This bund should be preserved.
Key Threatening Processes currently operating on the community are outlined in Figure10:

In conclusion, in view of the current condition of the site and the type of current landuse, it is considered that future environmentally sustainable development would not have a significant effect on the SSTF or its habitat. Protection, conservation and improvement of SSTF can be achieved on the subject site A Species Impact Statement is not recommended.

Key Threatening Processes

Key threatening processes under the NSW TSC Act and EPBC Act that are affecting Shale Sandstone Transition Forest are:

- Land clearance (EPBC Act); Clearing of native vegetation (NSW TSC Act)
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants (NSW TSC Act/EPBC Act); Invasion of native plant communities by exotic perennial grasses (NSW TSC Act); Invasion of native plant communities by African olive (NSW TSC Act)
- Competition and land degradation by rabbits (EPBC Act); Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (NSW TSC Act)
- Loss of hollow-bearing trees (NSW TSC Act)
- Removal of dead wood and dead trees (NSW TSC Act)
- Competition from feral honeybees (NSW TSC Act)
- Predation by European red fox (EPBC Act); Predation by the European red fox (*Vulpes vulpes*) (NSW TSC Act)
- Predation by feral cats (EPBC Act); Predation by the feral cat (*Felis catus*) (NSW TSC Act)
- Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases (EPBC Act); Anthropogenic climate change (NSW TSC Act)

◄Figure 10 Key Threatening Processes EPBC; The following threatening processes are currently impacting on the SSTF.

Assessment of Shale Sandstone Transition Forest in the Sydney Basin Bioregion under the EPBC Act 1999

SSTF is listed as a CEEC under the EPBC Act 1999 and is considered in the assessment below: An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will;

Reduce the extent of an ecological community

The community of SSTF is not considered to be reduced by future development. It is planned that the extent of the community on the subject site will be improved.

Fragment or increase fragmentation of an ecological community for example by clearing vegetation for roads or transmission lines.

Development works will be undertaken in areas that have been previously fragmented and are adjacent to existing development.

Adversely affect habitat critical to the survival of an ecological community.

Development will occur in an area that has previously been disturbed. Future action, which would be environmentally sustainable, will not adversely affect habitat critical to the survival of the community.

Modify or destroy abiotic (non living) factors (such as water, nutrients or soil) necessary for an ecological communities survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.

Future development would include a sewerage plan, designed to mitigate any increased nutrient or hydrological problems in the area of the future development and will not impact on the CEEC.

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.

It is unlikely that future proposed action will impact on the ecological function of the community on the subject site, such that keystone or important species of the ecological community are substantially affected or become extinct from the site. Regeneration will restore function so that a substantial change will not occur.

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.

Development is limited to the area of the construction footprint and removal of invasive species will be undertaken within the subject site.

Or cause 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.

The hydrology of development would be designed to be maintained and to restrict the mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community Therefore the proposed action is unlikely to have a significant impact on the ecological community.

Interfere with the recovery of an ecological community.

Previous disturbance has limited and modified the remnant **SSTF** on the subject site. The proposed action is unlikely to interfere with the recovery of the, SSTF in the north west corner. Inclusion of **SSTF** species in regeneration

and landscaping is in keeping with any recovery plan that would be implemented.

In considering the above factors, the section of the property where SSTF occurs can be rehabilitated and conserved as a condition of consent. It is considered that the remnant patch of SSTF has a high biological diversity in the local area.
In conclusion it is considered that there will not be a significant impact on the CEEC or its habitat as a result of future environmentally sustainable development and a referral to the federal minister is not recommended.

7.2)Assessment of Significance BC Act: *Phascolarctos cinereus (Koala)*

Species Outline: The koala is an arboreal marsupial with large furry ears and a vestigal tail. Its colour ranges from pale grey to grey brown and varies in size from 6.5 to 12 kg

Conservation Status: Vulnerable TSC Act 1995 Vulnerable EPBC Act.

Distribution: This species is distributed along the east Australia from north east Queensland to south east South Australia. There is a substantial colony of this species located in the Wedderburn area (CCC KPoM 2016)

Habitat: It finds habitat in a wide range of Eucalypt woodland, forest and utilizes isolated paddock trees. Koala males can range over an area of 200 ha. while a female has a habitat range of 15-20 ha. (Close 1999).

Diet: This nocturnal marsupial feeds on a range of eucalypt leaves of various species. In NSW the Koala has been observed utilising the leaves of 66 eucalypt and 7 non eucalypt species (Phillips 2000b).This varies immensely, as a feature of, type and nutrient content of individual trees and area. Koala food trees identified on the subject site are *Eucalyptus punctata, (SEPP44 species),E.tereticornis (SEPP44 species), , E.fibrosa, E.eugenoides, E. crebra, E.sclerophylla* and *E.amplifolia*

Breeding: Immature young are born after 35 days gestation with development continuing in the pouch. The young become independent at approximately 12 months.

Threats to this species includes:

Fragmentation and loss of habitat through clearing for agriculture and urban development.

Eucalypt forest dieback associated with over abundant psyllids and bell minors.
Predation by feral and domestic animals eg. dogs and foxes
Drowning in backyard swimming pools
Road kills, fire and disease.

"Five Part Test"

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The cleared grassland areas likely to be impacted upon, have reduced biodiversity to be impacted upon therefore the proposed development is unlikely to adversely impact the lifecycle of the species such that a local population is likely to be placed at risk of extinction. The degraded grassland area has been cleared with scattered trees for a long period of time It is unlikely that the lifecycle of *Phascolarctos cinereus* will be disrupted, such that a viable local population, is likely to be placed at risk of extinction, as future development would be confined to cleared degraded areas in close proximity to other development. Primary koala feed tree (*E.punctata, Etereticornis*) may be removed in the development process. It is anticipated that regeneration of *koala food trees* can be undertaken in the regeneration SSTF area outside the bushfire Asset Protection Zone.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(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

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

The threatened species is not an endangered ecological community.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological

community in the locality,

The area proposed for future development has already been modified and fragmented by past clearing events, land forming and weed invasion. The proposed development will not increase this fragmentation as it is adjacent to existing development. The habitat availability will not be altered as a consequence of the proposed development.
Regeneration and conservation of 0.14ha of the SSTF and the retention of SSTF trees will provide safe potential habitat for *Koalas* as they move through the area.
Future development is unlikely to impact on the long-term survival of any species, population or ecological community in the locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

There is no proximal area of outstanding biodiversity value that would be impacted by the proposed development either directly or indirectly.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Future development would see no further destruction of habitat for the threatened species. The future development area is significantly degraded and the development is not likely to result in the operation of, or increase the impact of, any key threatening process. The removal of noxious and environmental weeds is to be undertaken and the conservation and enhancement of 0.14ha of SSTF will protect potential habitat for the species.
Planting of koala foor trees in areas outside the bushfire APZ will provide habitat.
Habitat loss is the largest single cause of species extinction (NSW NPWS). With preservation and conservation of the remnant native vegetation, the development is not likely to result in the operation of, or increase the impact of, any key threatening process.
Dog attacks are a major threat to Koalas, therefore dog restraint or dog proof yards must be part of any future development in the area.

In conclusion, a search for this species failed to identify them on the site. No scratches or scats, indicating the presence of Koalas, were found. One motion sensor camera was set up for one week to monitor if koalas would access the subject site. No koalas were recorded. It is likely that koalas may

pass through the area to browse or accessing the large areas of habitat areas to the east or west. It is considered that the proposed development will not have a significant impact on the threatened species. A Species Impact Statement is not recommended.

b) **EPBC Act Assessment *Phascolarctos cinereus (Koala)***

a) Will the action lead to the long term decrease in the size of an important population of a species?

The proposed activity is unlikely to result in the long term decrease in the populations of *Phascolarctos cinereus* The area of potential habitat for these species, that would be impacted upon by the development, is small and the proposed development is located in a predominantly cleared degraded area close to existing development. It is not likely to lead to a long term decrease in the population size of these species. The species is highly mobile and able to access food resources in bushland areas on site. The planting of koala food trees on site would replace any removed for development.

b) Will the action reduce the area of occupancy of the species.

The potential for removal of this small area of habitat is unlikely to reduce the area of occupancy of the species. The species is highly mobile and regeneration on site will improve habitat for the species.

c) Will the action fragment an existing population of two or more populations of the species?

The action is not likely to fragment an existing population of two or more populations of the species. The proposed development is limited and in close proximity to existing development.

d) Will the action adversely affect habitat critical to the survival of a species?

The potential habitat for these species on site is not critical.

e) Will the action disrupt the breeding cycle of an important population?

As no extant breeding populations are anticipated to be impacted directly by the development it is unlikely that the action will disrupt the breeding cycle of a population.

f) Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The action will remove little habitat for *Phascolarctos cinereus.* A small number of koala food tree may be removed in the development area. Regenerated or planted trees are to be introduced at a ratio of 1:20. It is unlikely that the area of potential habitat is sufficient to see the species decline as the species is highly mobile.

g) *Will the action result in invasive species that are harmful to a threatened species become established in the threaten species habitat?*

The clearing of native vegetation has the potential to spread invasive species caused by carrying out the works. Weed control will be undertaken to minimize invasion of weeds.

h) Will the action interfere substantially with the recovery of the species?

The threatened species were not recorded within the proposed development area and potential habitat for the species is small. Removal of a small amount of habitat and replacement plantings is not likely to interfere with the recovery of these species.

Conclusion: The proposed development on the subject site is unlikely to cause a significant impact on the threatened species as determined by the assessment of significance. A referral of this action to the federal minister is not recommended. Indirect impacts are considered to be manageable by adherence to established building and design protocols. For example construction and excavation protocols to minimize the area of impact by confining them to the construction area will protect adjacent vegetation. Recommendations for Koala management include the following:

- Regeneration will improve habitat for the threatened species.
- Domestic dog control is to be implemented so that they do not present a threat to Koalas..

Appendix 11 provides an outline for living with Koalas.

8.0 Impact of Development and Constraints

Impact of the proposed development may be regarded as, direct, indirect and accumulative. However future development is unlikely to contribute further to the existing threats already existing on the site.

The most significant direct impact will be the removal of vegetation for future construction. The proposal will result in the clearance of an area of the subject site that is ecologically degraded, predominantly with exotic weeds and historic grazing disturbance and nutrient increase. The removal of a small number of SSTF trees may be required, however this action would be off set by regeneration along the north western boundary.
The major threat to plant communities in the Sydney bioregion is clearing, closely followed by weed infestation. It is therefore important that noxious and environmental weed control be continued on site as these species can spread into native communities.

A major impact of future development is soil disturbance as a feature of the cut and fill required to construct the dwellings and other infrastructure
Mitigating measures to minimize the impact of earth works are as follows:

- No machinery is to impinge upon the bushland areas
- At the commencement of earthworks, the topsoil is to be stripped and stored in low heaps <1m in height. Soil containment barriers are to be placed on the downside of soil heaps.
- The topsoil is to be spread over the fill so that there is no inversion of the soil layers.
- The spread of the soil is to be graded so that the depth of the soil under the canopy of the trees is<100mm and there is no accumulation of soil around the base of the trees.
- The topsoil is not to be compacted beneath the tree canopies.
- Erosion and sediment transportation can be mitigated by adhering to construction controls such as the erection of sediment fencing.
- Bushland areas in the vicinity are to be protected by using appropriate temporary fencing to stop access to sensitive areas.

Damage to trees may occur during the construction phase.
Adherence to the Australian Standard 4970 (Protection of Trees on Construction Sites 2009) is to be followed to prevent damage to retained trees in the development areas.
Change in light emissions and noise levels are considered to be minimal with regard to the proposed development. As the development abuts existing

development it is considered that there already exists a significant noise and light pollution in the area.
An increase in water and nutrient pollution is unlikely to occur. An appropriate town sewerage system would service the site

9.0 Recommendations and Conclusion

The survey conducted, indicated the following:-

1. The planning of future development on site must ensure that any disturbance or modification to the environment would occur in an area significantly ecologically degraded
2. The BC Act "5 part test" concluded that there would be no significant impact on the ecological communities of the SSTF or threatened species, therefore no further investigation is required, ie a Species Impact Statement is not recommended.
3. Assessment under EPBC Act found that the proposed development is unlikely to have a significant impact on the CEEC of the SSTF or the threatened species. A referral of this action to the federal minister for Environment, Water, Heritage and the Arts is not recommended.

To minimize any development impact on flora and fauna on/off site and to improve the biodiversity, the following mitigating and protective measures are recommended in line with recovery plans.

The removal of noxious and environmental weeds from the subject site would protect the threatened ecological community and threatened species in the local area. The removal of noxious and environmental weeds from the site is to be undertaken in line with the Noxious Weeds Act. The major threat to plant communities in the metropolitan and Wollondilly region is clearing, closely followed by weed infestation. The native vegetation is particularly at risk from weed infestation which results in a loss of natural regeneration, loss of biodiversity and a loss of long term viability of the vegetation communities. It is therefore important that noxious and environmental weed control continue to be undertaken on site. The weeds on site, particularly *Eragrostis curvulova* are a seed source for the spread by birds and wind into the surrounding relatively pristine areas.

Key Threatening Processes for several threatened birds and mammal species includes predation by feral cats and foxes. Similarly domestic cats are known to predate on native fauna. A covenant banning cats from the area should be applied as small mammals eg native mammals, birds, bats, frogs and lizards are all at risk from these predatory species.

The retention of all trees, with the exception of those requiring removal for construction, provision of access etc
Note: The removal of all trees within a bushfire APZ is not mandatory, only those which present a fire hazard eg. trees overhanging buildings and trees forming a continuous canopy between the fire hazard and the building.

During future construction, the development area is to be clearly delineated to protect the remaining natural environment. With regard to protecting trees during the construction phase, a protective fencing must be erected around trees near the construction area. A tree Asset Protection Zone (APZ) is to be established around such trees to minimise disturbance to their root zones. Any unavoidable incursions into this tree APZ area must be <20% of the root zone and construction eg sewerage works, must be achieved by underboring of roots.

The use of native plant species in landscaping would improve the biodiversity on the subject site.

The removal of trees may result in the loss of hollows, therefore it is recommended that 2 large nest boxes be erected on existing trees. There must be no net loss of hollows.

Any fencing to be constructed other than dog enclosures, must be environmentally friendly.

The drainage line is regarded as a first order stream and in line with legislation guidelines, a 10m regeneration area from the top bank of the creek must be constructed.

In conclusion, it is considered that there would be no constraints to the rezoning of the site to R5 and a proposed subdivision development on the subject site, under the EPBC Act or the BC Act. It is considered that the likely impacts of the proposed development will occur in an area that is substantially ecologically degraded

The rezoning and proposed development, taking into account the above recommendations, would provide a more positive environmental outcome than the present outlook for the subject site.

Appendix 1:Threatened Fauna and Flora

a)Threatened Plant Species

Scientific Name	Common Name	EPBC Act	BC Act	Habitat Preference Likelihood of Occurrence
Acacia bynoeana	Bynoe's Wattle / Tiny Wattle	V	E	Decumbent shrub to 0.5m high. Habitat is mostly heath and dry sclerophyll forest in mainly sandy soils. Habitat not present on the development site, unlikely (low) occurrence
Allocasuarina glareicola		E	E	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*. Common associated understorey species include *Melaleuca nodosa*, *Hakea dactyloides*, *Hakea sericea*, *Dillwynia tenuifolia*, *Micromyrtus minutiflora*, *Acacia elongata*, *Acacia brownei*, *Themeda australis* and *Xanthorrhoea minor*. Habitat present, degraded unlikely occurrence
Asterolasia elegans		E	E	Large erect shrub to 3m with stems and leaves covered in rusty stellate hairs, flowers August to September. Prefers sheltered eucalypt forest on moist lower slopes amongst sandstone boulders. Habitat not present on development site, unlikely occurrence.
Caladenia tessellata	Thick-lipped Spider-Orchid	V	E	Habitat is grassy sclerophyll woodland on clay/loam, sandy stony soils. Habitat not present on the development site, unlikely occurrence
Commersonia prostrata	Dwarf Kerrawang	E	E	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E.*

				haemostoma)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago. Habitat not present on the development site, unlikely (low) occurrence
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	Range of habitats, large populations usually occur in woodland dominated by *Eucalyptus sclerophylla, E sieberi, E gummifera & Allocasuarina littoralis.* Habitat not present on development site, however. Unlikely occurrence on small modified site.
Cynanchum elegans	White-flowered Wax Plant	E	E	Glabrous climber /twinner with corky stems and branchlets, to 10m long. Flowers November to March. It grows mainly in Dry vine thickets on fertile clay or volcanic soils. Habitat not present unlikely occurrence.
Epacris purpuracens var purpuresens			V	Found in poorly drained soils, usually on clay or sandstone in the Port Jackson area. Habitat not present on the development site, unlikely (low) occurrence
Eucalyptus aggregata	Black Gum	V	V	Grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly-drained flats and hollows. It commonly occurs with *E.rubida* (Candlebark), *E. viminalis* (Ribbon Gum), and *E. pauciflora*(White Sally, Snow Gum), with a grassy understorey of River Tussock *Poa labillardieri*. Habitat not present on cleared degraded grassland areas unlikely occurrence.
Eucalyptus macarthurii	Paddy's River Box		V	Prefers heavy alluvial moist soils in fairly cold areas of the tablelands. Habitat not present on cleared degraded grassland areas unlikely occurrence.
Genoplesium baueri	Yellow Gnat-orchid	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Habitat not present on subject site, Unlikely occurrence on small development area.
Grevillea parviflora ssp parviflora	Small flowered Grevillea	V	V	Small shrub range of habitat, forest, scrub, heath. Preferred habitat ridges and rocky slopes. Habitat present on

				subject site, however species not noted. Unlikely occurrence on small development area.
Halogris exalata ssp exalata	Wingless Raspwort	V	V	Square Raspwort appears to require protected and shaded damp situations in riparian habitats. Habitat not present on evelopment site, unlikely occurrence.
Leucopogon exolasius	Woronora Beard Heath	V	V	The plant occurs in woodland on sandstone. Habitat present on subject site, however species not noted. Habitat not present on development site, unlikely occurrence.
Melaleuca deanii	Deans Paperbark	V	V	Shrub to 2m in height. Habitat is lateritic, rocky or sandy ridges. Habitat present on subject site, however species not noted. Unlikely occurrence on small development area.
Pelargonium sp. Striatellum	Omeo's Stork Bill	E	E	Has a narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities. Habitat not present unlikely occurrence
Persoonia acerosa		V	V	rect or branching shrub to 2m in height. abitat is heath and dry woodland orest on sandy soils. Habitat present on bject site, however species not noted. ften germination is associated with fire soil disturbance,. Habitat not present development site, unlikely currence.
Persoonia bargoensis	Nodding Geebung	E	E	Erect to spreading shrub to 1.5m in height. Confined to aeolin and alluvial sediments in a range of sclerophyll forests. Habitat present on development site. Not noted, unlikely occurrence on small degraded site.
Persoonia hirsuta	Hairy Persoonia	E	E	Erect shrub to 1m tall. Habitat dry open forest, heathland and woodland on sandy soils or clay/sandy soils. Habitat not present on development site unlikely occurrence.

Persoonia glaucescens	Mittagong Geebung	V	E	Erect shrub to 3m tall. Habitat dry open forest, heathland and woodland on sandy soils or clay/sandy soils. Habitat present on development site unlikely occurrence on small degraded site.
Pimelea spicata	Spiked Rice Flower	E	E	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils.On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (*Eucalyptus moluccana*), forest red gum (*E. tereticornis*) and narrow-leaved ironbark (*E. crebra*). Blackthorn (*Bursaria spinosa*) is often present at sites (and may be important in protection from grazing) and kangaroo grass (*Themeda australis*) is usually present in the groundcover (also indicative of a less intense grazing history). Habitat not present on the development site, unlikely (low) occurrence
Pomaderris brunnea	Rufus Pomaderris	V	V	Shrub to 3m in height. Preferred habitat along streams or woodland on clayey alluvial soils. Habitat present , unlikely occurrence. on degraded development site
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Preference for growing in small pockets of shallow, sandy alluvial soils on sandstone rock shelves. Preference for wet heath on sandstone rock platforms. Habitat not present on subject site, species not noted. Unlikely occurrence on development site
Pultanea glabra			V	This species is primarily associated with riparian or swamp habitat areas in the mid to upper altitudes of the central Blue Mountains on sandstone derived soils. Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry

				sclerophyll forest and tall damp heath on sandstone. Habitat not present on the development site, unlikely (low) occurrence
Thelymitra kangaloonica	Kangaloon Sun Orchid	CE	CE	The Kangaloon Sun-orchid is endemic to the Central Coast/Tablelands of NSW, eg FitzroyFalls/Robertson/Kangaloon area. The species grows in seasonally swampy sedgeland on grey silty clay loam at 600–700 m above sea level. Habitat not present on development site,unlikely occurrence.
Thesium australe	Australian Toadflax	V	V	Small straggling herb to 40cm. Occurs in grassland or grassy woodland, often in association with *Themeda australis.* Habitat not present, on development site, unlikely occurrence

Note: Targeted surveys were conducted for the above threatened on the Future development area and throughout the subject site. No threatened species were observed. While the development area is degraded and not likely to support the above threatened species, the SSTF area is likely to provide potential habitat.

b)Threatened Fauna Species

Amphibians

Scientific Name	Common Name	EPBC Act	BC Act	Preferred Habitat/ likelihood of occurrence
Helioporus australiacus	Giant Burrowing Frog	V	V	Restricted to sandstone areas, prefers woodland and heath. Habitat not present on the development site vunlikely occurrence.
Litoria aurea	Green and Gold Frog	E	E	Habitat is permanent waterbodies. Habitat not present unlikely occurrence on subject site.
Litoria littlejoni	Littlejohn's Tree Frog	V	V	Shelters on high ridges under rocks in summer but prefers the margins of wet forests for breeding. Habitat not present, unlikely occurrence
Mixophyes balbus	Stuttering Frog	V	E	Preferred habitat is permanent streams in moist and wet sclerophyll forest. Habitat not present unlikely occurrence.
Pseudophryne australis	Red-crowned Toadlet		V	Habitat is usually open forest on Hawkesbury or Narrabeen Sandstone. Finds habitat in periodicly wet drainage lines below sandstone ridges. Habitat not present unlikely occurrence.

Reptiles

Scientific Name	Common Name	EPBC Act	BC Act	Preferred Habitat/ likelihood of occurrence
Hoplocephalus bungaroides	Broad-headed Snake	V	V	Restricted to sandstone areas, steep areas with exposed rocks, boulders & platforms. Shelters under exfoliated rocks. Habitat limited on subject site, unlikely occurrence on cleared development site.
Varanus rosenbergii	Rosenberg's Goanna		V	Habitat is open heath, forest and forest has large home range. Habitat present on small proposed building envelope, unlikely occurrence.

Mammals

Scientific Name	Common Name	EPBC Act	BC Act 1995	Preferred Habitat & Likelihood of Occurrence
Cercartetus nanus	Eastern Pygmy Possum		V	Inhabits dry & wet schlerophyll forest. Nests in tree hollows. Habitat present, unlikely occurrence on development site.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	The species has been found roosting in caves, overhangs, abandoned mine tunnels and disused fairy martin nests in sandstone cliffs and fertile woodland valley habitat within close proximity. Unlikely occurrence on development site for this wide ranging species.
Dasyurus maculatus	Spotted Tailed Quoll	V	V	Inhabits tropical to temperate regions. Open forest, savannah & scrubland. Prefers rocky country. Requires large un-fragmented ranges with little competition from foxes. Unlikely occurrence on small development site for this wide ranging species.
Falsistrellus tasmaniensis	*Eastern False Pipistrelle*		*V*	Hollow trunks of Eucalypt trees over 20 m high in wet sclerophyll forest and coastal mallee. Occasional old wooden buildings. Unlikely occurrence on small degraded site.
Isoodon obesulus obesulus	Southern Brown Bandicoot	E	E	Habitats includes heathland, shrubland, sedgeland, heathy open forest and woodland in a range of soil. They typically inhabit areas of dense ground cover. Suitable habitat for Southern Brown Bandicoots (eastern) to be any patches of native or exotic vegetation, within their distribution, which contains understorey vegetation structure with 50–80% average foliage density in the 0.2–1 m height range. Habitat not present, unlikely occurrence on cleared development site.
Miniopterus schreibersii	Eastern Bent-wing Bat		V	Various roosts, but mainly caves, also under bridges, in old

oceanensis				buildings, pipes and hollow trees. Has specific nursery sites characterized by conditions of high temperature and humidity. Habitat present in food resources but has no specific nursery sites available. Unlikely occurrence on development site for this wide ranging species.
Mormopterus norfolkensis	Eastern Mastiff or Free-tail Bat		V	In habits temperate to subtropical, wet & dry schlerophyll forest & woodland. Roosts in tree hollows, caves and man-modified habitats. Habitat limited, unlikely occurrence for this wide ranging species
Myotis macropus	Large footed myotis		V	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Habitat present, unlikely occurrence on cleared development site for this wide ranging species.
Petaurus norfolcensis	Squirrel Glider		V	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites. Occurrence unlikely on this cleared development site**.**
Petauroides volans	Greater Glider	V		Is usually found in eucalypt forests and woodlands along the east coast of Australia from north-eastern Queensland to the Central Highlands of Victoria. Habitat not present, unlikely occurrence on cleared development site.
Petrogale penicilliata	Brush-tailed Rock Wallaby	E	E	Habitat is on steep sites with exposed rocks, rock overhangs and platforms. Habitat not present, unlikely occurrence on small development site.

Phascolarctus cinereus	Koala	V	V	% of fodder trees establishes potential koala habitat. Limited habitat is present on the site. Unlikely occurrence on this small development area. likely infrequent occurrence as they travel through the area.
Potorous tridactylus tridactylus	Long Nosed Potaroo	V	V	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Unlikely occurrence as habitat not present
Pseudomys novahollandiae	New Holland Mouse	V		Found from coastal areas and up to 100 km inland on sandstone country. The species has been recorded from sea level up to around 900 m above sea level. On soils, with deeper top soils and softer substrates being preferred for digging burrows. Habitat present, unlikely occurrence on small development site.
Pteropus poliocephalus	Grey-headed Flying Fox	V	V	Habitat includes a range of vegetation assemblages, forest, woodland, scrub, heath as well as residential gardens and cultivated fruit crops. Habitat limited for this wide ranging species, unlikely occurrence.
Scoteanax rueppellii	Greater Broad-nosed Bat		V	Inhabits forest and roosts in tree hollows. Habitat limited, no nursery on site although food resources available. Large home range, unlikely occurrence on small development site.

Birds

Scientific Name	Common Name	EPBC Act	BC Act	Preferred Habitat & Likelihood of Occurrence
Artamus cyanopterus	Dusky Woodswallow		V	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Habitat present, unlikely occurrence on cleared development site.
Botaurus poiciloptilus	Australian Bitten	E	V	Reedbeds, swamps, rivers preferred habitat. Habitat present though very limited unlikely occurrence
Calidris ferruginea	Curlew Sandpiper	CE	CE	Habitat is coastal and inland mudflats. Habitat not present unlikely occurrence.
Callocephalon fimbriatum	Gang Gang Cockatoo		V	Range of habitats, forest, woodlands as well as parks and gardens. Habitat present, unlikely occurrence on cleared development site.
Calyptorhynchus lathami	Glossy Black Cockatoo		V	Feeds almost exclusively on Casuarinas Habitat present in development area Recorded roosting in trees near existing development.
Climacteris picumnus	Brown Treecreeper		V	Preferred habitat dry sclerophyll forest & woodland, particularly with fallen timber, rough barked trees and mature hollow bearing trees. Habitat limited in development area, unlikely occurrence.
Daphoenositta chrysoptera	Varied Sittella		V	Habitat forest , woodland, scrub, prefers rough barked trees Habitat limited in development area, unlikely occurrence.
Dasyornis brachypterus	Eastern Bristlebird	E	E	Inhabits low dense vegetation in a broad range of habitat types including sedgeland, heathland, swampland, shrubland, sclerophyll forest and woodland, and rainforest defined by a similar structure of low, dense, ground or understorey vegetation. Habitat not present, unlikely occurrence.
Falco subniger	Black Falcon		V	Distribution map showing records of the black falcon. The black falcon is widely distributed across mainland Australia, except densely forested areas. XXX

Grantiella picta	Painted Honeyeater	V	V	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder of mistletoe fruits growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. Habitat present, unlikely occurrence on small development site.

Hieraaetus morphnoides	Little Eagle		V	Occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. Habitat present but degraded, unlikely occurrence
Lathamus discolour	Swift Parrot	E	E	A migrant known to prefer feeding in Blue Gums, as well as Narrow-leaved Ironbarks of the Cumberland Plain and ridge-top shales. Requires winter flowering gums. Preferred habitat limited, unlikely occurrence
Melithreptus gularis gularis	Black Chinned Honeyeater		V	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. Habitat present, unlikely occurrence on cleared development site.
Ninox strenua	Powerful Owl		V	Roosts in dense forest, often along streams Home range of 400-1000 ha . Habitat limited unlikely occurrence
Numenius madagascariensis	Eastern Curlew	CE	CE	Habitat is estuaries, mudflats sandpits. Habitat not present, Unlikely occurrence on small development site for this wide ranging species.
Petroica boodang	Scarlet Robin		V	Habitat range of dry forest, woodland, mallee & scrubland. Habitat present, unlikely occurrence on small development site.
Rostratula australis	Australian Painted Snipe	M	E	Habitat is predominantly fringes of swamps, dams, nearby marshy areas where there is a cover of grasses, lignum, low scrub or open woodland. Habitat not present, unlikely occurrence.
Stagonopleura guttata	Diamond Firetail		V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.

				Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Habitat present, unlikely occurrence on cleared development site.
Xanthomyza phrygia	Regent Honeyeater	CE	E	Habitat is woodland assemblage. It prefers winter flowering gums but also areas where abundant insects are present. Habitat present, unlikely occurrence on small development site.

References for habitat assessments NSW DECC, Threatened Species Profiles NSW Scientific Committee,

Note: Habitat is present on the subject site for most of the above species in the SSTF area, however, it is unlikely that they would utilise this small area or the development area.

Appendix 2 Flora Noted on Survey the Survey Site

A) Native Flora

Genus Name	*Species Name*	*Common Name*
Adiantaceae	*Adiantum aethiopicum* *Chelianthes seiberi*	*Maidenhair Fern* Poison Rock Fern
Asteraceae	*Cassinia aculenta* *Euchiton sphaericum* *Olearia viscidula* *Olearia microphylla* *Ozothamnus diosmifolius*	*Sticky Cassinia* *Cudweed* *Wallaby Bush* *Bridal Daisy Bush* *Pill Flower*
Casuarinaceae	*Allocasuarina littoralis*	*Black She Oak*
Cassythaceae	*Cassytha glabella*	*Devils Twine*
Centrolepidaceae	*Centrolepsis strigosa*	*Hairy Centrolepsis*
Chenopodiaceae	*Einadia hastata*	*Saloop*
Clusiaceae	*Hypericum gramineum*	*Small St John's Wort*
Companulaceae	*Wahlenbergia gracilis*	*Native Bluebell*
Convolvulaceae	*Dichondra repens*	*Kidney Weed*
Crassulaceae	*Crassula seiberiana*	*Australian Stonecrop*
Cyperaceae	*Carex appressa* *Cyperus gracilis* *Gahnia seiberiana* *Juncus ursitatus* *Lepidosperma laterale*	*Tall Sedge* *Gahnia* *Common Rush* *Variable Sword Sedge*
Dennstaedtiaceae	*Pteridium esculentum*	*Bracken*
Dilleniaceae	*Hibbertia aspera ssp aspera* *Hibbertia diffusa*	*Rough Guinea Flower* *Guinea Flower*
Epacridaceae	*Epacris sp* *Leucopogon lanceolatus*	 *Lance-leaved Beard Heath*
Euphorbiaceae	*Poranthera microphylla* *Phyllanthus hirtellus*	*Small Poranthera* *Thyme Spurge*
Fabaceae	*Glycine clandestina* *Hardenbergia violacea* *Indigophora australis* *Pultenaea villosa*	*Twining VineGlycine* *False Sarsparella* *Indigophora*
Geraniaceae	*Geranium solandieri var solandieri*	*Cranesbill*
Goodeniaceae	*Goodenia bellidifolia ssp bellidifolia* *Goodenia hederacea*	 *Violet leaved Goodenia* *Fairy Fan Flower*

Haloragaceae	*Gonocarpus tetragynus*	*Common Raspwort*
Hyericaceae	*Hypericum gramineum*	*Small St Johns Wort*
Hypoxidaceae	*Hypoxis hydrometrica*	*Yellow Stars*
Iridaceae	*Patersonia sericea*	*Silky Purple Flag*
Lindsaceae	*Lindsaea linearis* *Lindsaea microphylla*	*Screw Fern* *Lacy Screw Fern*
Lilaceae	*Artropodium milleflorum* *Dianella caerulea* *Dianella longifolia*	*Pale Vanilla Lily* *Paroo Lily* *Blue Flax Lily*
Lobeliaceae	*Pratia purpurescens*	*White Root*
Mimosaceae	*Acacia longifolia* *Acacia falcata* *Acacia decurrens* *Acacia florabunda* *Acacia parramattensis* *Acacia terminalis* *Acacia ulicifolia*	*Sydney Golden Wattle* *Sickle Wattle* *Sydney Green Wattle* *Sally Wattle* *Parramatta Green Wattle* *Sunshine Wattle* *Prickly Moses*
Myrtaceae	*Callistemon linearis* *Eucalyptus amplifolia* *Eucalyptus eugenoides* *Eucalyptus globoidea* *Eucalyptus gummifera* *Eucalyptus longifolia* *Eucalyptus punctata* *Eucalyptus tereticornis* *Kunzia ambigua* *Leptospermum polygalifolium* *Melaleuca decora* *Melaleuca linaearifolia* *Melaleuca styphelioides* *Melaleuca thymifolia*	*Narrow-leaved Bottlebrush* *Cabbage Gum* *Thin-leaved Stringybark* *White Stringybark* *Red Bloodwood* *Grey Gum* *Forest Red Gum* *Tick Bush* *Yellow Tea Tree* *Snow in Summer* *Prickly Paperbark* *Thyme Honey Myrtle*
Oxalidaceae	*Oxalis perennans*	
Pittosporaceae	*Billardiera scandens* *Bursaria spinosa* *Pittosprum undulatum*	*Apple Dumplings* *Native Blackthorn* *Sweet Pittospermum*
Poaceae	*Austrostipa pubescens* *Austrodanthonia tenuior* *Austostipa ramosissima* *Aristida ramosa* *Aristida vagans* *Danthonia sp* *Dichelachne crinita* *Echinopogon caespitosus* *Entolasia stricta* *Eragrostis sp* *Imperata cylindrica* *Microleana stipoides* *Oplismenus aemulus*	*Tall Spear Grass* *Wallaby Grass* *Bamboo Grass* *Three-awn SpearGrass* *Three awn Spear Grass* *Wallaby Grass* *Plume Grass* *Tufted Hedgehog Grass* *Wiry Panic* *Love Grass* *Blady Grass* *Weeping Grass* *Basket Grass*

	Poa labillardieri *Themeda australis*	*Tussock Grass* *Kangaroo Grass*
Proteaceae	*Hakea dactyloides* *Hahea salicifolia*	*Forest Hakea* *Willow Hakea*
Ranunculaceae	*Clematis aristida*	*Old Mans Beard*
Rubiaceae	*Pomax umbellata*	*Pomax*
Santalaceae	*Exocarpus cupressiformis*	*Cherry Ballarat*
Sapindaceae	*Dodonea triquetra*	*Hop Bush*
Scrophulariaceae	*Veronica plebeia*	*Speedwell*
Solanaceae	*Solanum prinophyllum*	*Forest Nightshade*
Thymelaeaceae	*Pimelea linifolia*	*Rice Flower*
Tremandraceae	*Tetratheca thymifolia*	
Xanthorroeaceae	*Lomandra longifolia* *Lomandra filiformis ssp filiformis* *Lomandra multiflora* *Lomandra obliqua* *Xanthorrhoea minor*	*Mat Rush* *Small Mat Rush* *Fish Bones* *Minor Grass Tree*

Note: identification of some species was difficult as a result of

- ***some grasses had dropped their seed***
- ***lack of floristic features***

Key
Sp = species
Ssp= subspecies
Var=variety

b) Exotic Flora Noted on the Study Site

Genus Name	*Species Name*	*Common Name*
Apiaceae	*Daucus carota*	*Wild Carrot*
Asteraceae	*Biddons pilosa* *Cirsium vulgare* *Conyza bonariensis* *Hypocharis glabra* *Hypocharis radicata* *Setaria gracilis* *Sonchus oleaceous* *Senecio madagascariensis* *Tagetes minuta* *Taraxacum officinale* *Verbena bonariensis*	*Farmers Friends* *Scotch Thistle* *Fleabane* *Smooth Catsear* *Catsear* *Slender Pigeon Grass* *Sow Thistle* *Fireweed* **NW** *Dandelion* *Purple Tops*
Brassicaceae	*Brassica rapa*	
Caryophyllaceae	*Stellaria media*	*Chickweed*
Caprifoliaceae	*Lonicera japonica*	*Honeysuckle*
Cupresaceae	*Cupressus sp*	*Leighton Green Cyperrus*
Cyperaceae	*Cyperus eragrostis*	
Euphorbiaceae	*Euphorbia peplus*	*Petty Spurge*
Fabaceae	*Trifolium repens*	*Clover*
Malvaceae	*Sida rhombifolia* *Modiola carolinana*	*Paddys Lucerne* *Red Flowered Mallow*
Oxalidaceae	*Oxalis corniculata*	*Yellow Wood-sorrel*
Plantaginaceae	*Plantago lanceolata*	*Lambs Tongue*
Phytolaccaceae	*Phytolacca octandra*	*Inkweed*
Poaceae	*Agrostis capillaries* *Avena fatua* *Brizza major* *Cynodon dactylon* *Ehrhartia erecta* *Eragrostis curvulova* *Lolium perenne* *Paspalum dilatatum* *Pennesetum clandestinum* *Phalaris minor* *Setaria gracilis* *Dactylis glomerata*	*Bent Grass* *Wild Oats* *Quaking Grass* *Couch* *Panic Veldt Grass* *African Love Grass NW* *Perenial Rye Grass* *Paspalum* *Kikuyu* *Phalaris* *Slender Pigeon Grass* *Cocksfoot*
Polygonaceae	*Acetosella vulgaris*	*Sorrel*
Rosaceae	*Rubus fruiticosa*	*Blackberry* **NW**
Solanaceae	*Solanum nigrum*	*Deadly Nightshade*

Key NW = Noxious Weed

Appendix 3 Fauna and Avifauna Noted on, or Near the Survey Site

Mammals

Vulpes vulpes Fox*
Canus familiaris Dog*
Felis catus Cat*
Oryclolagus culninciolus Rabbit*
Wallaby bicolour Swamp Wallaby

Amphibians & Reptiles

Crinia signifera Eastern Froglet
Lymnodynasties peronii Striped Marsh Frog
Lamprophalia delicata Grass Skinks

Avifauna Noted

COMMON NAME	SCIENTIFIC NAME
Australian King Parrot	*Alisterus scapularis*
Australian Magpie	*Gymnorhina tibicen*
Australian Raven	*Corvus coronoides*
Bronzwing Common	*Phaps chalcoptera*
Common Blackbird	*Turdus merula* *
Common Keol	*Eudynamys scolopacea*
Crested Pigeon	*Geophaps lophotes*
Crimson Rosella	*Platycerus elegans*
Eastern Rosella	*Platycerus eximius*
Eastern Yellow Robin	*Eopsaltria australis*
Gallah	*Eolophus roseicapilla*
Masked Lapswing	*Vanellus miles*
Grey Fantail	*Rhypidura fuliginosa*
Jacky Winter	*Microeca facinans*
Laughing Kookaburra	*Dacelo novaeguineae*
Little Wattlebird	*Anthoceara chrysoptera*
Noisy Minor	*Manorina melanocephala*
Silvereye	*Zosterops lateralis*
Southern Boobook Owl	*Ninox novaeseelandiae*
Sulphur Crested Cockatoo	*Cacatua galerita*
Superb Fairy Wren	*Maluris cyaneus*
White Browed Scrub Wren	*Sericornis frontalis*
White-winged Chough	*Corcorax melanorhamphos*
Willy Wagtail	*Rhypidura leucophrys*
Wonga Pigeon	*Leucosarcia melanoleuca*
Yellow-tailed Cockatoo	*Calyptorhynchus funereus*

Appendix 4 References

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Appendix 5
Procedure for using positive diagnostic species for the identification of Map Units

This procedure is based on the probability of sampling positive diagnostic species that occur more frequently within the target unit than in all survey sites combined. The minimum expected number of positive diagnostic species was calculated for each map unit based on the available survey data. New plots may belong to any candidate map unit for which counts of diagnostic species exceed this minimum number, although these inferences are subject to 5%
statistical error rate (i.e. one out of 20 inferences will be incorrect). Conversely, the presence of fewer than the minimum expected number of positive diagnostic species may be considered evidence that the sample plot does not belong to the map unit under consideration, subject to 5% statistical errors. If applied correctly, this procedure will narrow the identification of a stand of vegetation to a few plausible alternative units. If a sample plot contains the minimum expected number of positive diagnostic species for more than one map unit, the number of species by which the minimum was exceeded may be used to assess the closeness of the match to each of the possible candidates.

The map unit identification procedure assumes that all vascular plant species within the sample plots were recorded and correctly identified, that the list of positive diagnostic species is based on a comprehensive random sample of each map unit, and that the identification samples are randomly selected from within the same study area and use the same plot size (0.04 ha) as the original samples. Occurrences of droughts and the time since fire may influence whether all vascular species can be recorded in samples of particular communities. The procedure cannot be reliably applied to samples that do not contain more than a specified minimum number of species (species-poor sites can not be tested).

Appendix 6 Flora Fauna Habitat Potential Classification

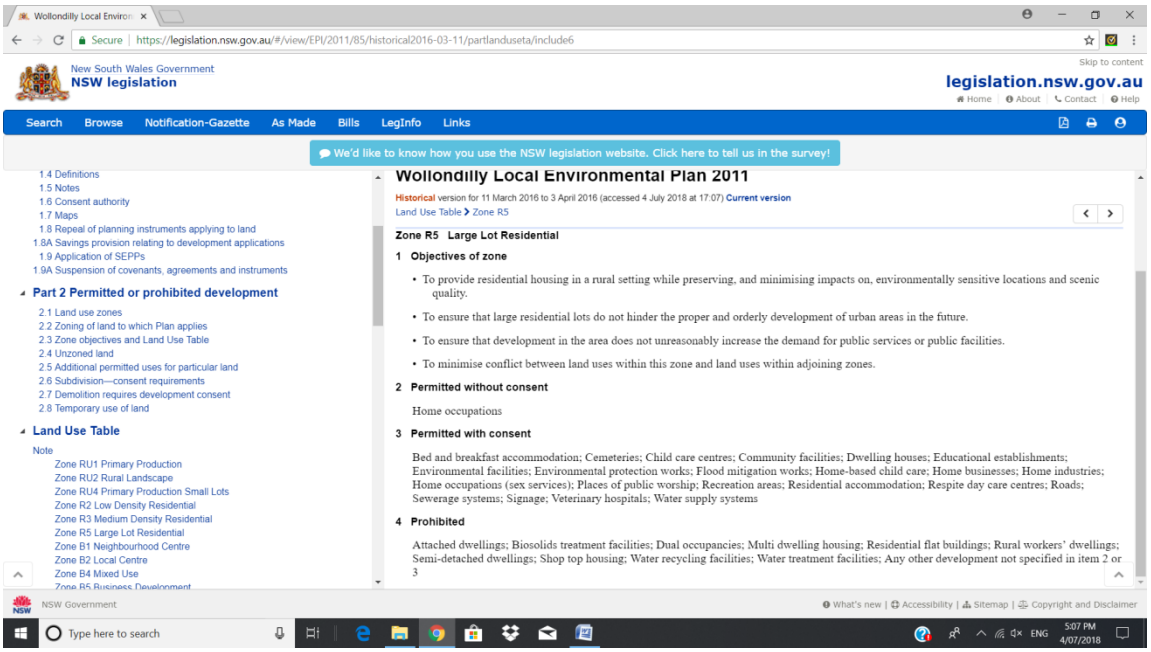
Flora

Classification	Conditions
1 Good	High number of indigenous species ie species richness.
	Vegetation structure representative of the original layers of the vegetation community ie canopy, shrub and ground layers intact.
	No weed present or occurrence restricted to perimeter or track margins.
2 Moderate	Moderate number of indigenous species.
	One or more layers of the community structure modified, but largely intact.
	Moderate level of weed invasion with weeds in patches or scattered throughout.
3 Poor	Low number of indigenous species.
	One or more layers of the community structure highly modified, or one or more original vegetation layers missing.
	High level of weed invasion with weeds occurring in dense patches or scattered throughout.

Fauna

1 Good	High species richness and structural diversity of floral community with ground, log and litter layer intact. Breeding, nesting, roosting and feeding resources abundant
	Few exotic fauna and flora, high number of native fauna.
2 Moderate	Moderate species richness and structural diversity of floral community with ground, log and litter layer moderately intact. Breeding, nesting, roosting and feeding resources moderate. Moderate diversity and abundance of native animals.
3 Poor	Low species richness and structural diversity of floral community with ground, log and litter layer degraded. Breeding, nesting, roosting and feeding resources low.
	Low diversity and abundance of native animals.

Appendix 7 Land Zoning R5



Appendix 8 Likelihood of Occurrence Assessment

Likelihood of occurrence	Criteria
Low	*Have not been recorded on the subject site or within the local area which are beyond the current known geographic range
	*Are dependent on specific habitat site or resources that are not present on the subject site or in the local area.
	*Are considered extinct in the locality
Moderate	*Have been recorded previously infrequently on the subject site and surrounds eg vagrant
	*Use habitat types or resources that are present on the subject site and surrounds, although resources are generally in a poor or modified condition.
	*Are unlikely to maintain sedentary populations , however may utilize resources within the study area opportunistically when resources are seasonally available or during migration
High	*Have been recorded previously in the study area
	*Are dependant on habitat types or resources that are present in the study area that are abundant and / or in good condition within the study area
	*Are known or likely to maintain resident populations surrounding the study area
	*Are known or likely to visit the study area or surrounds during regular seasonal movement or migration.
Recorded	*Recorded in the study area during the current survey

Appendix 9 Protected Matters Search Tool

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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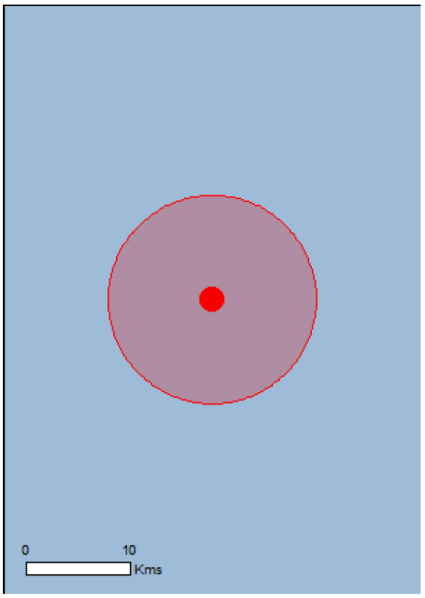

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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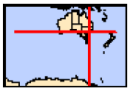


Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	10
Listed Threatened Species:	48
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	49
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
The Greater Blue Mountains Area	NSW	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
The Greater Blue Mountains Area	NSW	Listed place

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community may occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community may occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		

Name	Status	Type of Presence
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat may occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat may occur within area
Commersonia prostrata Dwarf Kerrawang [87152]	Endangered	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat may occur within area
Eucalyptus macarthurii Camden Woollybutt, Paddys River Box [7827]	Endangered	Species or species habitat may occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Leucopogon exolasius Woronora Beard-heath [14251]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat likely to occur within area
Persoonia acerosa Needle Geebung [7232]	Vulnerable	Species or species habitat likely to occur within area
Persoonia bargoensis Bargo Geebung [56267]	Vulnerable	Species or species habitat likely to occur within area
Persoonia glaucescens Mittagong Geebung [12770]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat may occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Telstra Corporation Limited

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bargo	NSW
Bargo River	NSW
Nattai	NSW
Thirlmere Lakes	NSW
Upper Nepean	NSW

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species

Name	Status	Type of Presence
		habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.296 150.5808

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Appendix 10 Living with Koalas

Additional information regarding Koalas (Phascolarctos cinereus) from https://www.savethekoala.com/about-koalas/living-koalas-how-can- you-help-protect-them

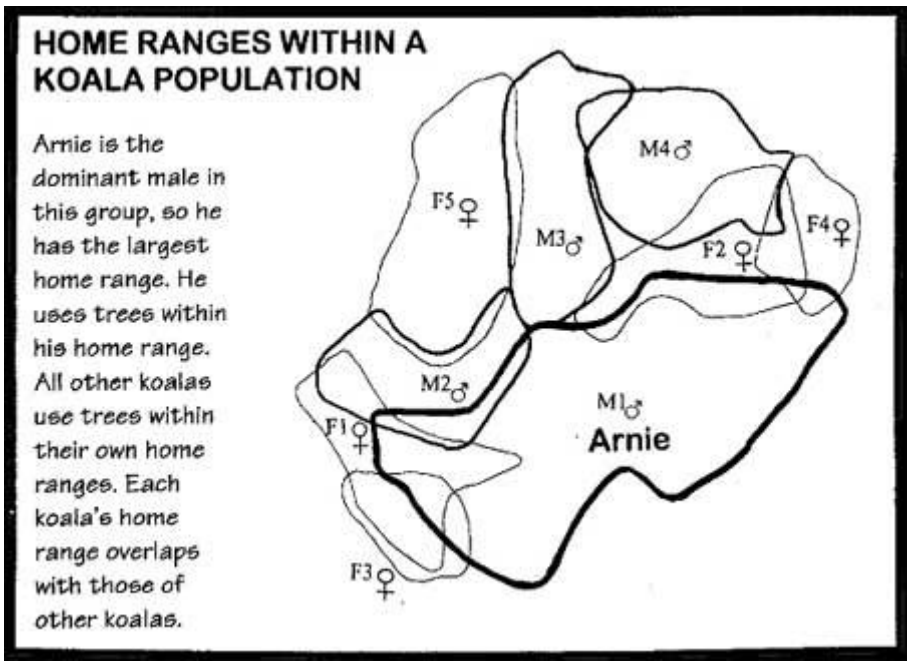
Koalas in the wild face a series of threats to their continued survival. A major threat is the continuing urbanisation of their habitat and associated threats like cars and dogs. Over 4,000 Koalas are killed each year by dogs and cars alone. In addition, stress caused by the loss of their habitat causes symptoms of diseases like chlamydia.
Approximately 80% of original Koala habitat has already been destroyed. This has forced Koalas to live alongside people in urban areas, and means that property owners have a special responsibility to take the particular needs of Koalas into consideration in their lifestyle.

Because most Koala habitat is on private land, people living in areas with Koalas can have a great influence on whether Koala populations in their area survive or become extinct. It is their responsibility, along with government at all levels, to assist in preserving this precious resource. Because much of the Koala's habitat is zoned residential, or is in farming areas, their future is largely dependent upon the attitude of property owners.

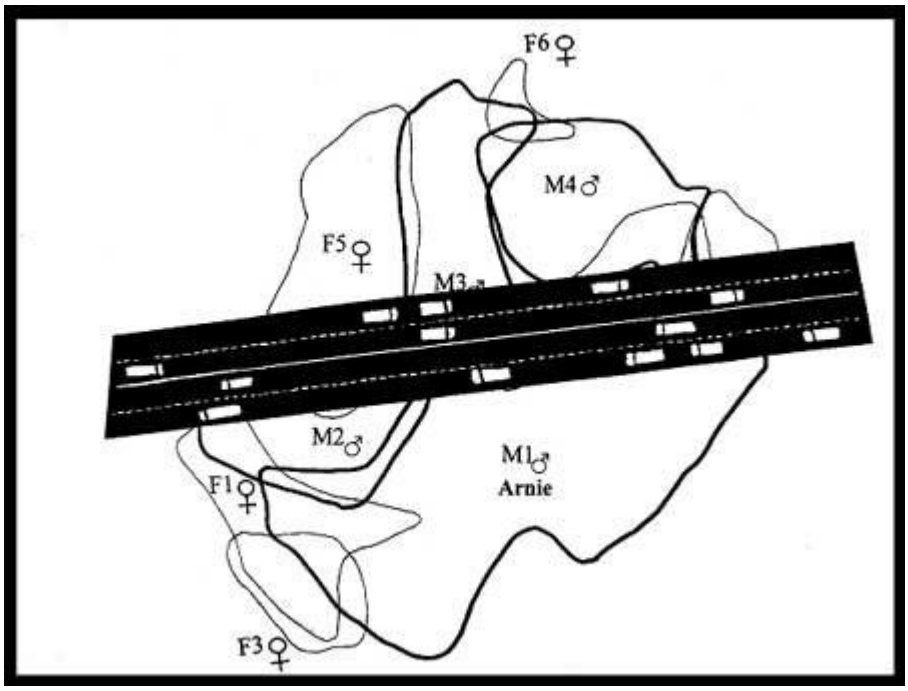
While landowners have certain rights, the Koalas and other wildlife which live there also have rights - the right to live in a safe environment with adequate food and shelter and the right to freedom of movement. Remember, Koalas do not live in OUR backyards. We live in THEIRS!

This information is designed to help those who live in Koala habitats to understand something of how Koalas live and how they can assist in keeping them safe.

Wild Koalas live in highly defined social groups and each Koala in a stable group maintains its own HOME RANGE. Each Koala's home range is made up of a number of HOME RANGE TREES. The Koala will visit these same trees regularly. Each Koalas's home range overlaps those of other Koalas to allow for social contact and for mating. It is thought that Koalas keep the same home range for life unless there is disturbance to their habitat. If the home range trees are removed, the Koala loses both food and shelter. Because of the structure of overlapping home ranges, the Koala may not be able to just move 'next door' if its trees are destroyed, as 'next door' may already



be the home range of another Koala. Also, if a road or house is placed between the trees in a Koala's home range, the Koala cannot get to its trees, or it may need to cross busy roads to get to them. A Koala in this situation may wander around trying to access it's regular trees or in an attempt to find new ones. When a road or housing development bisects the habitat of a Koala popluation, the effects can be catastrophic for the Koalas.



- to change trees in their home range,
- to find new territory, in the case of destroyed habitat,
- young Koalas dispersing from their mothers to establish a home range.
- in the breeding season, Koalas will move through other home ranges in search of a mate.

The breeding season runs roughly from August to February, and this is when most activity occurs. Because Koalas are mostly nocturnal, nighttime is the most dangerous time for Koalas. Whilst on the ground, Koalas are most at risk from cars, dogs and other predators.

VEGETATION

Keep native vegetation on your block. Don't destroy eucalypts and other native vegetation. As well as being homes for Koalas, they are food, shelter and nesting sites for many other native animals and birds. The hollows in older trees are very important to many animals and they may take hundreds of years to develop. If we destroy all the older established

trees, where are these animals going to live and nest until new trees mature to this level?

Koalas also like to rest in, and sometimes eat, the leaves of other types of native trees. Plant trees along fences and creeklines as linkages to parks and bushland, allowing the Koalas more safety from dogs and cars Do not plant Koala trees in places which would encourage Koalas into danger, such as on main roads, fenced in with swimming pools or close to power lines. Choose trees to suit the soil type and site.

More ways to keep koalas safe:

- Drive slowly and carefully at night. Koalas are nocturnal. Keep to the speed limits.
- Carry a sack, blanket, towel or box in your car, in case you encounter an injured animal when out driving.
- Carry a copy of this information in your car so that you will know what to do if you come across a sick or injured Koala.
- Carry the phone number of your local Koala group or rescue service in your car.
- Inform new and established neighbours about Koalas in the area and make sure they have a copy of this information.
- Also inform your neighbours if a Koala is in the vicinity and suggest they restrain their dogs until the Koala moves off.
- Report any sick, injured or dead Koalas to your local wildlife group or National Parks and Wildlife Service.
- Be careful with garden sprays, pesticides and creosote. Koalas sometimes eat soil, and can also absorb these poisons through the pads on their feet or through eating the leaves of trees which have been affected by chemicals.
- In times of drought or in particularly hot weather, place a container of water for the Koala at the base of a known home tree. (NB: If the tree

is in your yard, keep your dog restrained, even during the day)

- Observe Koalas from a distance. Don't throw things at a Koala to make it move. Wild Koalas become stressed very easily.
- Never try to pat a wild Koala – it's not as cuddly as it looks! Those sharp claws and teeth can inflict quite a nasty wound.

Teach your children to love and appreciate all wildlife. Remember,

- though, it is important to tell them about things they can do to help. Children can become quite depressed if they continually hear negative messages about the environment. Empower them by encouraging them to do some of the things suggested in this brochure, like responsible dog ownership, planting trees and writing letters to newspapers and politicians.
- Familiarize yourself with your local dog regulations, tree preservation orders, state planning legislation and Endangered Species Act. Adhere to these laws and notify the relevant authority if others contravene them.
- Keep vigilant in your local area about habitat destruction and about the welfare of Koalas. Notify your local wildlife group and the Australian Koala Foundation if you are concerned.
- Write to politicians and newspapers with your concerns. Suggest your council erects signs warning of Koalas crossing roads, improves street lighting etc.
- Join your local Koala or general wildlife group. Support them in their fundraising ventures and ask them how you can help in other ways. Your local Koala group is one of a number of local groups in Australia which are involved in taking care of sick and injured animals and/or being active in keeping an eye on local Koala issues. Most groups rely on volunteers and have to raise their own funds. Please get involved and assist them in any way you can.

Specifications for Dogs kept on site

Prior to any pet dog being held on the property a dog proof yard must be installed on the property to house the dog (s). This yard must not include any Koala Food Trees and be a minimum of 300m^2 around a residential dwelling or part thereof. Yard-fencing must be a minimum of 1.8 m high and either be buried or partly buried or have an associated buried component to a minimum depth of 0.3m. All gated into the enclosed area must be of the same height and general structure as the yard-fence and must have a minimum clearance above ground to allow for the swinging of the gate, below which must be a solid barrier such as concrete to deter digging