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EPBC Act ecological assessment

Warnervale Town Centre
111, 99-107 Sparks Rd, and
236-260 Hakone Road,
Woongarrah

April 2018
(REF: A17211F)

Flora & Fauna EPBC Assessment

111, 99-107 Sparks Rd, and 236-260 Hakone Road, Woongarrah
APRIL 2018

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Executive Summary

This EPBC Act ecological assessment report has been prepared by *Travers bushfire & ecology* to assess the ecological impacts on EPBC listed matters of the proposed development at 111, 99-107 Sparks Rd, and 236-260 Hakone Road, Woongarrah.

The subject site includes the Stages 5 to 10 development areas, inclusive of proposed open space reserve. A Biodiversity Certification Assessment Report for the Warnervale Town Centre was produced by *Eco-Logical Australia* (ELA) on 21 March 2012).

A Development Application was granted consent in 2012 for the subdivision of the site into 134 residential lots (DA/1704/2012/A). Detailed flora and Fauna assessment was carried out at the time by *Conacher Environmental Group* (CEG) (December 2012).

Subsequent to the issue of the consent in 2012, an Order Conferring Biodiversity Certification on the Warnervale Town Centre area was signed on 30th February 2014. This has the effect of approving vegetation removal on the site to allow the development of the Town Centre, without the need for further environmental assessment under NSW Legislation.

Recorded threatened flora, fauna & EECs

Updated ecological survey and habitat assessment has been undertaken in accordance with the *Environment Protection and Biodiversity Conservation Act 1999*.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*:

- No Commonwealth listed threatened or migratory fauna species were recorded within the subject site;
- No threatened flora species were recorded within the subject site;
- No endangered populations were recorded on site or considered likely to occur;
- No Threatened Ecological Communities were observed within the subject site.

The proposed development is considered to have a not significant impact on matters of national environmental significance (Refer to Attachment 2 – Significant Impact Assessment). As such, a referral to the Department of Environment and Energy (DoEE) is not required.

Ecological Impacts

The key ecological impacts are as follows:

- The subject site is approximately 26.27 ha in size. There are some cleared areas totalling approximately 4.18 ha. The proposal is expected to remove all (approximately 22.1 ha) of the remaining vegetation within the subject site.

- The vegetation communities within the subject site are Blackbutt – Turpentine Open Forest and Smooth-barked Apple – Red Bloodwood Open Forest. Neither of these vegetation communities are commensurate with any Commonwealth listed threatened ecological community.

- Records of threatened species within the locality, indicate that there is some suitable habitat for a number of Commonwealth listed threatened flora and fauna species within the subject site. These species were: *Acacia bynoeana, Angophora inopina, Corunustylis insignis, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata, Cryptostylis hunteriana*, Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and the newly listed *Corunustylis* sp. Charmhaven.

- Targeted searches were undertaken and none of the above Commonwealth listed threatened flora species were observed within the subject site. The Grey-headed Flying-fox was not observed within the subject site by ELA, CEG or TBE and is considered to have only opportunistic or seasonal foraging habitat within the site. The Regent Honeyeater and Swift Parrot are migratory and are also considered to have only seasonal foraging habitat within the subject site which provides only low quality foraging habitat. There is very limited winter foraging flowering trees within the subject site.

- The proposed development will require the removal of fifty four (54) or more hollow-bearing trees.

Mitigation measures

The following recommendations are made to minimise the above potential ecological impacts, address threatening processes and to create a better ecological outcome for the site.

- Protection of and restoration of the riparian / drainage vegetation and the restoration of native vegetation within the riparian corridors is recommended. A Vegetation Management Plan (VMP) is recommended for the subject site to identify the ongoing management of the reserves, drainage corridor and associated vegetation, habitat tree management, nest box installation requirements, protection and restoration of riparian zones and long term management of all these areas.

- Retain the hollow-bearing trees which may be identified as being located in the proposed open space park or drainage corridor and selected trees within the urban landscape subject to the arborist assessment.

- The felling of hollow-bearing trees is to be conducted under the direction or supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken and to safeguard against impacting on any fauna species that may be found during clearing operations.

- Hollows containing or likely containing resident fauna where possible should be sectionally removed and relocated into good condition trees within the open space or drainage reserves. All other hollows that cannot be relocated due to poor condition are to be replaced with nest boxes at a minimum 1:1 ratio. The size of nest boxes, materials used, placement location and criteria for nest boxes are to be addressed within the VMP.

- Planting of foraging plants for EPBC listed fauna species known to frequent the site or have potential habitat, eg. winter flowering trees and those with high nectar content.

Conclusion

The subject site is currently a rural residential landscape with large areas (22.1 ha) of relatively undisturbed native vegetation and approximately 4.18 ha of cleared or highly disturbed land.

The proposed Riparian / Drainage reserve will retain a portion of the better quality vegetation. The overall quality of vegetation within the subject site ranges from poor to good. This is a result of previous land management practices such as land clearing and subsequent regrowth as well as impacts from land uses. As a result, the subject site has limited habitat suitable for threatened flora species.

It is considered that the proposed development will not have a significant impact on any of the identified Commonwealth listed threatened or migratory species.

Fifty-four (54) hollow-bearing trees were recorded within the southern parts of the subject site by CEG (Dec 2012). Compensatory installation of nest boxes is recommended to reduce the impact of the proposal on hollow dependent fauna that currently utilise the site and provide alternative breeding habitat for the life of the nest boxes. This approach should also be supplemented with tree planting within street curtilage and Open Space areas.

It is concluded that the proposed subdivision of the subject site (Stages 5 to 10 – Warnervale Town Centre) will not result in a significant impact on any Commonwealth listed threatened species, migratory species or threatened ecological communities (TECs) or their habitats.

The proposed action is unlikely to significantly impact any matters of National Environmental Significance (NES). No further assessments are considered to be required under the *Environment Protection and Biodiversity Conservation Act 1999*. As such, a referral to Department of Environment and Energy (DoEE) is not required.

List of abbreviations

APZ	asset protection zone
BPA	bushfire protection assessment
CEG	Conacher Environmental Group
CLUMP	conservation land use management plan
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from 4/07)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from 10/09)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from 4/11)
DoEE	Commonwealth Department of the Environment and Energy
EEC	endangered ecological community
ELA	Eco-Logical Australia
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act*
EPBC Act	*Environment Protection and Biodiversity Conservation Act*
ESMP	ecological site management plan
FF	flora and fauna assessment
FM Act	*Fisheries Management Act*
FMP	fuel management plan
HTA	habitat tree assessment
IPA	inner protection area
LEP	Local Environment Plan
LGA	local government area
NES	national environmental significance
NPWS	NSW National Parks and Wildlife Service
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (Part of the NSW Department of Premier and Cabinet)
OPA	outer protection area
PBP	*Planning for bushfire protection 2006*
POM	plan of management
RF Act	*Rural Fires Act*
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SEPP 44	*State Environmental Protection Policy No 44 – Koala Habitat Protection*
SEWPAC	Federal Department of Sustainability, Environment, Water, Population and Communities – Now DoEE
SIS	species impact statement
SULE	safe useful life expectancy
TBE	Travers Bushfire and Ecology
TPO	tree preservation order
TPZ	tree preservation zone
TRRP	tree retention and removal plan
TSC Act	*Threatened Species Conservation Act, 1995* (superseded by BC Act, dependent upon LGA)
VMP	vegetation management plan

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Introduction 1

This EPBC Act ecological assessment report has been prepared by *Travers bushfire & ecology* to assess the ecological impacts on EPBC listed matters of the proposed development at 111, 99-107 Sparks Rd, and 236-260 Hakone Road, Woongarrah., hereafter referred to as the subject site.

A Biodiversity Certification Assessment Report for the Warnervale Town Centre was produced by *Eco-Logical Australia* (ELA) on 21 March 2012). A Development Application granted consent in 2012 for the subdivision of the site into 134 residential lots (DA/1704/2012/A). Detailed flora and Fauna assessment was carried out at the time by *Conacher Environmental Group* (GEG) (December 2012).

Subsequent to the issue of the consent in 2012, an Order Conferring Biodiversity Certification on the Warnervale Town Centre area was signed on 30th February 2014. This has the effect of approving vegetation removal on the site to allow the development of the Town Centre, without the need for further environmental assessment under NSW Legislation.

A map of the Warnervale Biodiversity Certified area with the subject site indicated is provided in Figure 1.

The study area for this report is located within the Warnervale Town Centre planning precinct which has been Biocertified and therefore no further ecological assessment is required at a State level.

Figure 2 shows the proposed precinct layout with the subject site boundary for this report superimposed in Red

Figure 1 – Warnervale Town Centre Biodiversity Certified Area (Subject site shown in Red)
(Source: Order conferring Biodiversity Certification on Warnervale Town Centre OEH 2014)

1.1 Aims of this assessment

The aims of this assessment are to:

- Carry out up to date seasonal botanical surveys to locate any threatened flora that may be listed within the Commonwealth *EPBC Act* (1999),
- Complete targeted surveys for threatened species, populations and ecological communities that are listed within the Commonwealth EPBC Act (1999),
- Prepare a flora and fauna impact assessment in accordance with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and the Matters of National Environmental Significance (NES) and the associated Significant Impact Guidelines (DoEE 2013).

1.2 Statutory requirements

1.2.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The *EPBC Act* requires that Commonwealth approval be obtained for certain actions. It provides an assessment and approvals system for actions that have a significant impact on matters of *national environmental significance* (NES). These include:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- World Heritage properties
- National Heritage places
- Great Barrier Reef Marine Park
- nuclear actions, and
- a water resource, in relation to coal seam gas development and large coal mining development

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

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, then the matter needs to be referred to the Department of Environment (DoE) for assessment. In the case where no listed federal species are located on site then no referral is required. The onus is on the proponent to make the application and not the Council to make any referral.

A threshold criterion apply to specific NES matters which may determine whether a referral is or is not required, consultation with DoEE may also be required to determine whether a referral is or is not required. If there is any doubt as to the significance of impact or whether a referral is required, a referral is generally recommended to provide a definite decision under the EPBC Act 1999 thereby removing any further obligations in the case of 'not controlled' actions.

A significant impact is regarded as being:

important, notable, or of consequence, having regard to its context or intensity and depends upon the sensitivity, value, and quality of the environment which is impacted and upon the duration, magnitude, and geographical extent of the impacts. A significant impact is likely when it is a real or not a remote chance or possibility.

Source: EPBC Policy Statement

Guidelines on the correct interpretation of the actions and assessment of significance are located on the department's web site http://www.environment.gov.au/epbc/publications.

1.3 Proposed works

The proposed development is for a new town square within a town centre comprising of higher, medium and lower density commercial developments surrounded by Residential and Open Space / Detention areas. The subject site (to be developed in stages 5 to 10) forms part of this development as shown in Figure 2.

Figure 2 - Proposed Warnervale Town Centre with overlaid subject site boundary in Red

1.4 Site description

The planning and cadastral details of the subject site are provided in Table 1.1, Table 1.2 summarises the geographical characteristics of the site and Table 1.3 outlines previous site disturbance.

Table 1.1 – Site details

Location	Lot 1 DP376264 – 236-260 Hakone Road Woongarrah Lots 54 & 55 DP7527– 236-260 Hakone Road Woongarrah Lot 32 DP1198972 – 121 Sparks Road Woongarrah Lot 41 DP1200210 – 107 Sparks Road Woongarrah Lots 51 & 52 DP561032 – 103 & 99 Sparks Road Woongarrah
Description of location	The subject site is located to the east of the Northern Railway Line and is adjoined to the east and west by other land associated with the Warnervale Town Centre.
Area	Approximately 26.27 ha
Topographic map	Dooralong 1:25,000 9131-1S
Grid reference	GDA-56: 356860E 6321140N Lat. / Long: -33.2392 151.4637
Local government area	Central Coast Council (formerly Wyong Shire Council)
Existing land use	Undeveloped native vegetation with a centrally located cleared area - used as an illegal dump
Proposed development	Residential subdivision as part of Warnervale Town Centre with Open Space and drainage areas.

Table 1.2 – Site characteristics

Elevation	Approximately 26-60m AHD
Topography	The proposed development area is situated on slight to moderate slopes with a ridgetop located in the central parts of the subject site.
Aspect	All aspects from the central high point
Geology and soils	Soil landscapes; Woodburys Bridge residual soil landscape on the higher elevations - shallow to moderately deep (50–150 cm) Yellow Podzolic Soils on sandstone bedrock. Gorokan erosional Soil Landscape on the mid-slope to lower elevations - light coloured lithic sandstone, pebbly in part, red brown and grey green claystone and siltstone with rare conglomerate. Geology: Narrabeen Group Sandstones - Clifton Subgroup - Tuggerah Formation.
Catchment / Drainage	Un-named Watercourse which discharges into Wallarah Creek - Budgewoi Lake – Tuggerah Lake – South Pacific Ocean via The Entrance
Vegetation	Blackbutt – Turpentine Open Forest is located in the central-northern parts of the subject site. Smooth-barked Apple – Red Bloodwood Open Forest is located over the remainder of the subject site.

Table 1.3 – Site disturbance

Clearing	Approximately 4.18 ha (15.9%) within the subject site has been cleared for previous land uses. The remainder of the site contains native vegetation which in some small areas is disturbed by partial underscrubbing or invasion by Lantana.
Land Uses	Some cleared areas were for past land uses such as rural residential. The hilltop or central cleared area was used as an illegal dump. (This area is currently fenced off with asbestos warning signs fixed at regular intervals along the fence).
Earthworks	Previous earthworks are limited to the cleared illegal dump in the centre of the site totalling approximately 2.13ha.
Introduced weeds	The open forest areas adjacent to previously cleared areas have a moderate influx of exotic grasses. Some small areas of vegetation also adjacent to previously cleared areas are moderately impacted upon by Lantana.
Evidence of feral, introduced or domestic fauna	Domesticated Dogs, European Red Fox, rabbits and Horses, were recorded during survey. These species have varying impacts on locally occurring native flora and fauna species.

Survey Methodology 2

2.1 Information collation, technical resources, desktop assessments, specialist identification and licences

A review of the relevant information pertinent to the subject site was undertaken.

Client documents reviewed include:

- *Biodiversity Certification Assessment Report for the Warnervale Town Centre* produced by Eco-Logical Australia (ELA) (21 March 2012),
- *Flora and Fauna Assessment Report, Proposed development Lot 1 DP 700096 & Lots 2 & 3 DP7738 Sparks Road, Woongarrah* produced by Conacher Environmental Group (CEG) (December 2012, Ref 2092/2F).

Standard Technical Resources utilised:

- *Matters of National Environmental Significance – Significant Impact Guidelines* 1.1 (DoEE 2013)
- Aerial photographs (Google Earth Pro / Spatial Information Exchange / NearMap)
- Topographical maps (scale 1:25,000)
- NSW Bionet / Atlas of NSW Wildlife (OEH 2018)
- Protected Matters Search Tool (DoEE, 2018)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *The natural vegetation of the Wyong Local Government Area, Central Coast, New South Wales:* (Bell, S. A. J. 2002/2008)

Desktop Assessment:

To determine the likely and actual occurrence of flora species, fauna species and plant communities on the subject site, desktop assessments were undertaken including:

- ***A literature review*** – A review of readily available literature for the area was undertaken to obtain reference material and background information for this survey.

- ***A data search*** – A search of the *Atlas of NSW Wildlife / Bionet website* (OEH 2018) was undertaken to identify records of threatened flora and fauna species located within a 10km radius of the site. Searches were also undertaken on the DoE – 'protected matters search tool' (PMST) website to generate a report that will help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in the area of interest. The PMST search was broadened to a 10km radius like the Bionet search. These two searches combined, enabled the preparation of a list of threatened flora and fauna species that could potentially occur within the habitats found on the site (Tables A2.1, A2.2 and A2.3).

Accuracy of identification:

Specimens of plants not readily discernible in the field were collected for identification. Structural descriptions of the vegetation were made according to Specht *et al* (1995).

***Licences*:**

Individual staff members of *Travers bushfire & ecology* are licensed under Clause 20 of the *National Parks and Wildlife (Land Management) Regulation 1995* and Sections 120 & 131 of the *National Parks and Wildlife Act 1974* to conduct flora and fauna surveys within service and non-service areas. NPWS Scientific Licence Number: SL100848.

Travers bushfire & ecology staff are licensed under an Animal Research Authority issued by the Department of Agriculture. This authority allows *Travers bushfire & ecology* staff to conduct various fauna surveys of native and introduced fauna for the purposes of environmental consulting throughout New South Wales.

2.2 Flora survey methodology

A search of the *Atlas of NSW Wildlife* / *Bionet database* (OEH 2018) was undertaken to identify records of threatened flora species located within a 10km radius of the site. Searches were also undertaken on the Department of Environment and Energy (DoEE) – 'protected matters search tool' website to generate a report that will help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in the area of interest. Both of these search was broadened to a 10km radius. These two searches enabled the preparation of a combined list of threatened flora and fauna species that could potentially occur within the habitats found on the site.

Seasonal threatened flora surveys were conducted across all of the subject site. This included a random meander search in accordance with Cropper (1993) to determine areas of potential habitat for each of the targeted species. Targeted searches for threatened species within areas of suitable habitat were undertaken as applicable using a box pattern with transects separated by approximately 6 to 10 metres depending on conditions such as covering vegetation / view range or the cryptic nature of the target species.

Updated searches of the *Atlas of NSW Wildlife* and EPBC Act PMST were undertaken in early December 2017 and early March 2018 resulting in one newly listed flora species which requires consideration.

2.3 Fauna survey methodology

Updated searches of the *Atlas of NSW Wildlife* and EPBC Act were undertaken in early December 2017 and early March 2018. This provided a list of threatened fauna species which may have suitable habitat within the subject site.

The likelihood of threatened fauna to utilise the subject site was determined by habitat surveys and assessments within the site. These habitat assessments provide information on the likelihood of individual fauna species utilising the subject site based on the number and quality of habitat attributes. Information on these attributes are provided in Section 3.2.1.

2.4 Field survey effort

Tables 2.1 and 2.2 below detail the flora and fauna survey effort undertaken for the subject site.

Table 2.1 – Flora survey effort

Flora survey	Method	Dates
Vegetation communities	Survey of the boundaries of all communities – field verification and aerial photographic interpretation	13-14/12/2017
Targeted seasonal searches	Targeted seasonal searches in areas of suitable habitat	13-14/12/17 7.0 hrs 01/02/2018 3.7 hrs 15/03/2018 5.6 hrs 29/03/2018 7.0 hrs

Field survey dates were designed to ensure that they were undertaken during the flowering period of *Cryptostylis hunteriana* and *Corunastylis sp.* Charmhaven.

Ecological Assessment 3

3.1 Matters of national environmental significance - flora

3.1.1 Threatened flora species (national)

A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10km radius of the site.

Based on the habitat assessment within Appendix 2.1, it is considered that the subject site provides varying levels of potential habitat for the following nationally listed threatened flora species:

Table 3.1 – Nationally listed threatened flora species with suitable habitat present

Scientific name	EPBC Act Status	Potential to occur
Rutidosis heterogama	V	High
Corunastylis insignis	CE	Moderate
Tetratheca juncea	V	Moderate
Acacia bynoeana	V	Moderate
Corunastylis sp. Charmhaven	CE	Limited
Cryptostylis hunteriana	V	Low
Angophora inopina	V	Low
Caladenia tessellata	V	Very Low

These species have been considered for habitat presence and potential to occur within Appendix 2.

Most species have been considered previously and surveyed for during their flowering season. *Travers bushfire & ecology* has undertaken some additional surveys in December which may pick up species such as *Cryptostylis, Tetratheca* and *Acacia* from Table 2.1 which may be difficult or virtually impossible to locate unless flowering. *Corunastylis sp.* Charmhaven is quite newly listed. Consultation was undertaken with Central Coast Council to assist in identifying the flowering period for 2018 as it varies by a few weeks each year and there is only a short flowering period of 2-3 weeks usually. Two (2) survey sessions during the 2018 flowering period have been undertaken to adequately survey for the species.

No nationally listed threatened flora species were observed within the subject site.

3.1.2 Endangered ecological communities (national)

No nationally listed Threatened Ecological Communities (TECs) were observed within the subject site.

3.1.3 National flora and TEC assessment conclusions

In accordance with the National Significant Impact Criteria for Critically Endangered, Endangered and Vulnerable flora species as well as Threatened Ecological Communities (Appendix 2) concluded that the proposed development was not likely to have a significant impact on matters of national environmental significance listed under the *EPBC Act 1999*. As such a referral to Department of Environment and Energy is not required in respect to flora.

3.2 Matters of national environmental significance - fauna

3.2.1 Fauna habitat

The fauna habitats present within the site are identified within Table 3.2.

Table 3.2 – Observed fauna habitat

Topography				
Flat ✓	Gentle ✓	Moderate ✓	Steep	Drop-offs
Vegetation structure				
Closed Forest	Open Forest ✓	Woodland ✓	Heath	Grassland ✓
Disturbance history				
Fire	Under-scrubbing ✓	Cut and fill works		
Tree clearing ✓	Grazing ✓			
Soil landscape				
DEPTH:	Deep	Moderate ✓	Shallow ✓	Skeletal
TYPE:	Clay	Loam ✓	Sand ✓	Organic
VALUE:	Surface foraging	Sub-surface foraging	Denning/burrowing	
WATER RETENTION:	Well Drained ✓	Damp / Moist ✓	Water logged	Swamp / Soak
Rock habitat				
Very Little				
Feed resources				
FLOWERING TREES:	Eucalypts ✓	Corymbias ✓	Melaleucas ✓	
	Banksias	Acacias ✓		
SEEDING TREES:	Allocasuarinas ✓	Conifers		
WINTER FLOWERING EUCALYPTS:	C. maculata	E. crebra	E. globoidea	E. sideroxylon
	E. squamosa	E. grandis	E. multicaulis	E. scias
	E. robusta	E. tereticornis ✓	E. agglomerata	E. siderophloia
FLOWERING PERIODS:	Autumn ✓	Winter	Spring ✓	Summer ✓
OTHER:	Mistletoe ✓	Figs / Fruit ✓	Sap / Manna	Termites
Foliage protection				
UPPER STRATA:	Dense	Moderate ✓	Sparse ✓	
MID STRATA:	Dense	Moderate ✓	Sparse ✓	
PLANT / SHRUB LAYER:	Dense ✓	Moderate ✓	Sparse ✓	
GROUNDCOVERS:	Dense	Moderate ✓	Sparse	
Hollows / logs				
TREE HOLLOWS:	Large ✓	Medium ✓	Small ✓	
TREE HOLLOW TYPES	Spouts / branch ✓	Trunk ✓	Broken Trunk	Basal Cavities	Stags ✓
GROUND HOLLOWS:	Large	Medium	Small	
Vegetation debris				

FALLEN TREES:	Large		Medium ✓		Small ✓	
FALLEN BRANCHES:	Large		Medium ✓		Small ✓	
LITTER:	Deep		Moderate		Shallow ✓	
HUMUS:	Deep		Moderate		Shallow	
Drainage catchment						
WATER BODIES	Wetland(s)	Soak(s)	Dam(s)	Drainage line(s) ✓	Creek(s)	River(s)
RATE OF FLOW:	Still		Slow ✓		Rapid ✓	
CONSISTENCY:	Permanent		Perennial		Ephemeral ✓	
RUNOFF SOURCE:	Urban / Industrial	Parkland		Grazing ✓	Natural ✓	
RIPARIAN HABITAT:	High quality	Moderate quality		Low quality	Poor quality ✓	
Artificial habitat						
STRUCTURES:	Sheds		Infrastructure		Equipment	
SUB-SURFACE	Pipe / culvert(s)		Tunnel(s)		Shaft(s)	
FOREIGN MATERIALS:	Sheet		Pile / refuse ✓			

3.2.2 Threatened fauna species (national)

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the subject site. These species have been listed in Table A1.2 (Appendix 1), and those with potential habitat within the subject site are considered in the Significant Impact Criteria within Appendix 2.

Based on the habitat assessment within Appendix 1, it is considered that the subject site provides varying levels of potential habitat for the nationally listed threatened fauna species shown in Table 3.3

Table 3.3 – Nationally listed threatened fauna species with suitable habitat present

Common name	EPBC Act Status	Potential to occur
Grey-headed Flying-fox	V	Foraging only

No nationally listed threatened fauna species were recorded within the subject site during recent surveys undertaken in 2017-18.

3.2.3 Protected migratory species (national)

The EPBC Act Protected Matters Report provides additionally listed terrestrial, wetland and marine migratory species of national significance likely to occur, or with habitat for these species likely to occur, within a 10km radius of the subject site. These migratory species are considered for habitat suitability in Table A1.3 (Appendix 1).

3.2.4 National fauna assessment conclusions

It is considered that the proposed development is unlikely to have a significant impact on threatened or migratory fauna species listed as matters of national environmental significance under the *EPBC Act 1999*. As such a referral to Department of Environment and Energy is not be required in respect to fauna.

Conclusions & Recommendations 4

4.1 Conclusions

The document forms the basis of assessment required with regard to matters of National Environmental Significance under the Commonwealth *EPBC Act*. These assessments determine if future development of the site is likely to have a significant effect on nationally listed threatened species, populations and / or EECs.

EPBC Act

In respect of matters required to be considered under the *EPBC Act:*

- No threatened flora or fauna species were recorded within the subject site.
- Suitable habitat for a number of threatened flora and fauna species (*Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata, Cryptostylis hunteriana, Corunastylis insignis*, *Corunastylis* sp. Charmhaven and Grey-headed Flying-fox) was observed within the subject site.
- No threatened migratory species were observed within or over the subject site.
- Suitable habitat for a number of listed migratory species was recorded within or over the subject site.
- No Threatened Ecological Communities (TECs) were observed within the subject site.

Consideration of these species within Appendix 2 – Nationally Significant Impact Assessment of this report concluded that the proposed development is not likely to have a significant impact on matters of NES. As such, a referral to DoEE is not required.

Conclusion

It is concluded that the proposed subdivision of the subject site is unlikely to result in a significant impact on any Commonwealth listed threatened or migratory species, population or threatened ecological communities.

The proposed action will not have any significant impact on any matters of National Environmental Significance (NES). As such no further assessments or referrals are considered to be required under the *Environment Protection and Biodiversity Conservation Act 1999*.

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Threatened & Migratory Species Habitat Assessment

A1

Table A2.1 below provides an assessment of potential habitat within the subject site for nationally listed threatened flora species recorded within 10km on the Atlas of NSW Wildlife Database (OEH) or indicated to have potential habitat present within 10km on the EPBC Protected Matters Search Tool.

Table A1.1 – Threatened flora habitat assessment

Common name ***Scientific name*** DATABASE SOURCE	**BC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Acacia bynoeana OEH EPBC	E1	V	Erect or spreading shrub to 0.3m high growing in heath and dry sclerophyll Open Forest on sandy soils. Often associated with disturbed areas such as roadsides. Distribution limits N-Newcastle S-Berrima.	x	✓	4 km NE (41 records within 10km)	2003	Moderate	✓

Angophora inopina OEH EPBC	V	V	Small tree in open sclerophyll forest growing on deep sandy soils with associated lateritic outcrops. Distribution limits N-Wyee S-Gorokan with a disjunct population near Karuah.	x	✓	1.5 km W (2818 records within 10km)	2005	Low	✓
Asterolasia elegans EPBC	E1	E	Erect shrub 1-3m high growing in moist sclerophyll forests on Hawkesbury sandstone slopes hillsides. Distribution limits Maroota region.	x	x	-	-	x	x
Caladenia tessellata OEH EPBC	E1	V	Terrestrial orchid. Clay-loam or sandy soils. LHCCREMS guidelines suggest the species grows in Map Unit 34 – Coastal Sand Wallum Woodland - Heath. Flowers in September – November. Distribution limits N-Swansea S-south of Eden.	x	x	4 km SW (2 records within 10km)	1953	Very Low	✓
Corunustylis/ Genoplesium insignis EPBC	CE	CE	Grows in patches of *Themeda australis* (Kangaroo Grass) amongst shrubs and sedges in heathland and woodland. Favours dry sclerophyll woodland dominated by *Eucalyptus haemastoma* (Scribbly Gum), *Corymbia gummifera* (Red Bloodwood), *Angophora costata* (Smooth-barked Apple) and *Allocasuarina littoralis* (Black She-oak).	x	✓	1.5 km E (24 records within 10km)	2015	Moderate	✓
Corunastylis sp. Charmhaven OEH EPBC	CE	CE	Terrestrial orchid currently only known from the Wyong Shire of NSW in the Gorokan/Charmhaven area. It occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include *Allocasuarina littoralis, Leptospermum juniperinum, Melaleuca nodosa, Callistemon linearis* and *Schoenus brevifolius.* Flowers likely in Feb-Mar.	x	✓	400m E 400m SW (96 records within 10km)	2013	Low	✓

Cryptostylis hunteriana OEH EPBC	V	V	Saprophytic orchid. Grows in swamp heath on sandy soils. Distribution limits N-Gibraltar Range S-south of Eden.	x	x	1 km S (29 records within 10km)	2016	Low	✓
Cynanchum elegans EPBC	E1	E	Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. Distribution limits N-Gloucester S-Wollongong.	x	x	-	-	x	x
Diuris praecox EPBC	V	V	Terrestrial orchid. Grows in sclerophyll forest near the coast. Distribution limits N-Nelson Bay S-Ourimbah.	x	x	-	-	x	x
Eucalyptus camfieldii OEH EPBC	V	V	Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. Distribution limits N-Norah Head S-Royal NP.	x	x	3km WNW (10 records within 10km)	2005	x	x
Genoplesium baueri EPBC	E1	E	A terrestrial orchid that grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Feb – Mar Distribution limits N – Hunter Valley S – Nowra	x	x	-	-	x	x
Grevillea parviflora subsp. *parviflora* OEH EPBC	V	V	Open to erect shrub to 1m. Grows in woodland on light clayey soils Distribution limits N-Cessnock S-Appin.	x	x	2 km S (136 records within 10km)	2003	x	x
Melaleuca biconvexa OEH EPBC	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. Distribution limits N-Port Macquarie S-Jervis Bay.	x	x	-	-	x	x
Pelargonium sp. *Striatellum* EPBC	E1	E	Herb to 90cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Varied distribution from SE NSW to QLD.	x	x	-	-	x	x

Prostanthera askania OEH	E1	E	Erect shrub. Grows in sclerophyll forest on ridges in or adjacent to Rainforest. Distribution limits Strickland SF region.	x	x	-	-	x	x
Prostanthera junonis EPBC	E1	E	Small shrub. Grows in sclerophyll forest and heath in shallow soil on sandstone. Distribution limits Somersby region.	x	x	-	-	x	x
Pultenaea glabra EPBC	V	V	Erect shrub. Grows in moist, sheltered section of dry sclerophyll forest on sandstone in Higher Blue Mountains and Glen Davis areas.	x	x	-	-	x	x
Rhizanthella slateri EPBC	V	E	Underground orchid that is poorly known. Grows in sclerophyll forests. Usually only seen if the soil is disturbed. Flowers in Oct – Nov.	x	x	-	-	x	x
Rutidosis heterogama OEH EPBC	V	V	Erect herb to 30cm. Grows mostly in heath, often along roadsides. Distribution limits N-Maclean S-Hunter Valley.	x	✓	120m W (174 records within 10km)	2003	High	✓
Syzygium paniculatum OEH EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. Distribution limits N-Forster S-Jervis Bay.	x	x	-	-	x	x
Tetratheca juncea OEH EPBC	V	V	Prostrate shrub to 1m high. Dry sclerophyll forest and heath. Distribution limits N-Bulahdelah S-Port Jackson.	x	Sub-optimal	1 km W (298 records within 10km)	2000	Moderate	✓

Thelymitra adorata OEH EPBC	CE	CE	Known only from Wyong, Warnervale and Wyongah on the New South Wales Central Coast. Habitat is from 10-40 m a.s.l. in grassy woodland or occasionally derived grassland in well-drained clay loam or shale derived soils. The vegetation type in which the majority of populations occur (including the largest colony) is a Spotted Gum - Ironbark Forest with a diverse grassy understorey and occasional scattered shrubs.	x	x	1 km W (82 records within 10km)	2016	Not Likely	x
Thesium australe EPBC	V	V	Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. Distribution limits N-Tweed Heads S-south of Eden.	x	x	-	-	x	x

OEH	- Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	- Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
TBE	- Denotes additional species considered by *Travers bushfire & ecology* to have potential habitat based on regional knowledge and other records
V	- Denotes vulnerable listed species under the relevant Act
E or E1	- Denotes endangered listed species under the relevant Act
CE or E4A	- Denotes critically endangered listed species under the relevant Act
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle

A detailed assessment in accordance with the EPBC Significant Impact Criteria will be completed for these species in Appendix 2 of this report.

Table A1.2 below provides an assessment of potential habitat within the subject site for nationally listed threatened fauna species recorded within 10km on the Atlas of NSW Wildlife Database (OEH) or indicated to have potential habitat present within 10km on the EPBC Protected Matters Search Tool.

Table A1.2 – Threatened fauna habitat assessment

Common name ***Scientific name*** DATABASE SOURCE	**BC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Giant Burrowing Frog *Heleioporus australiacus* EPBC	V	V	Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. *Distribution Limit: N-Near Singleton S-South of Eden.*	x	x	-	-	x	x
Stuttering Frog *Mixophyes balbus* OEH EPBC	E	V	Terrestrial inhabitant of rainforest and wet sclerophyll forests. *Distribution Limit: N-near Tenterfield S-South of Bombala*.	x	x	-	-	x	x
Giant Barred Frog *Mixophyes iteratus* OEH EPBC	E	E	Terrestrial inhabitant of rainforest and open forests. *Distribution Limit: N-Border Ranges National Park. S-Narooma.*	x	Sub-optimal	4 km W (5 records within 10km)	1984	Not Likely	x
Green and Golden Bell Frog *Litoria aurea* OEH EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. *Distribution Limit: N-Byron Bay S-South of Eden.*	x	Sub-optimal	2 km S (12 records within 10km)	1993	Not Likely	x

Common name ***Scientific name*** DATABASE SOURCE	**BC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Littlejohn's Tree Frog *Litoria littlejohnii* EPBC	V	V	Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. *Distribution Limit: N-Hunter River S-Eden.*	x	x	-	-	x	x
Australasian Bittern *Botaurus poiciloptilus* OEH EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. *Distribution Limit: N-North of Lismore. S- Eden.*	x	x	-	-	x	x
Swift Parrot *Lathamus discolour* OEH EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution Limit: N-Border Ranges National Park. S-South of Eden*.	x	x	-	-	x	x
Eastern Bristlebird *Dasyornis brachypterus* EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x

Common name ***Scientific name*** DATABASE SOURCE	**BC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Regent Honeyeater *Xanthomyza Phrygia* OEH EPBC	E4A	CE	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast *Distribution Limit: N-Urbanville. S-Eden.*	x	x	5 km S (19 records within 10km)	2002	x	x
Painted Honeyeater *Grantiella picta* OEH EPBC	V	V	A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. *Distribution Limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.*	x	x	-	-	x	x
Spotted-tailed Quoll *Dasyurus maculatus* OEH EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution Limit: N-Mt Warning National Park. S-South of Eden.*	x	x	4 km E (20 records within 10km)	2007	x	x

Common name ***Scientific name*** DATABASE SOURCE	**BC Act**	**EPBC Act**	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Koala *Phascolarctos cinereus* OEH EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Greater Glider *Petauroides volans* EPBC	-	V	Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows *Distribution Limit: N-Border Ranges National Park. S- South of Eden.*	x	x	-	-	x	x
Long-nosed Potoroo *Potorous tridactylus* OEH EPBC	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey. *Distribution Limit: N-Mt Warning National Park. S-South of Eden.*	x	x	10 km SSW (1 record within 10km)	2016	x	x

Common name *Scientific name* DATABASE SOURCE	BC Act	EPBC Act	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded on site				Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
Brush-tailed Rock-wallaby *Petrogale penicillata* EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. *Distribution Limit: N-North of Tenterfield. S-Bombala.*	x	x	-	-	x	x
Grey-headed Flying-fox *Pteropus poliocephalus* OEH EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. *Distribution Limit: N-Tweed Heads. S-Eden.*	x	Foraging Only	100 m W (79 records within 10km)	2013	Foraging Only	✓
Large-eared Pied Bat *Chalinolobus dwyeri* OEH EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. *Distribution Limit: N-Border Ranges National Park. S-Wollongong.*	x	x	-	-	x	x

Common name *Scientific name* DATABASE SOURCE	BC Act	EPBC Act	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded on site				Considered in Accordance with NES Significant Impact Guidelines (✓) Refer to Appendix 2
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
New Holland Mouse *Pseudomys novaehollandiae* EPBC	-	V	Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recolonise of regenerating burnt areas. *Distribution Limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x

OEH	-	Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	-	Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
TBE	-	Denotes additional species considered by *Travers bushfire & ecology* to have potential habitat based on regional knowledge and other records
V	-	Denotes vulnerable listed species under the relevant Act
E	-	Denotes endangered listed species under the relevant Act
E	-	Denotes critically endangered listed species under the relevant Act
NOTE:	1.	This field is not considered if no suitable habitat is present within the subject site
	2.	'records' refer to those provided by the *Atlas of NSW Wildlife*
	3.	'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle

A detailed assessment in accordance with the EPBC Significant Impact Criteria will be completed for these species in Appendix 3 of this report.

Table A1.3 below provides an assessment of potential habitat within the subject site for nationally *protected* migratory fauna species recorded within 10km on the EPBC Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A1.2 above.

Table A1.3 – Migratory fauna habitat assessment

Common name ***Scientific name***	**Preferred habitat** ***Migratory breeding***	**Comments**
Oriental or Horsfield's Cuckoo (*Cuculus optatus*)	It mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground.	Suitable roosting, breeding and foraging habitat present. Most suitable areas of habitat are conserved within the Open Space and drainage line portions of the subject site. Not likely to be significantly impacted by the proposal.
White-throated Needletail (*Hirundapus caudacutus*)	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies forage often along favoured hilltops and timbered ranges. *Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia.*	Suitable foraging habitat present in the airspace over the site. Not recorded during survey. Not likely to be significantly impacted by the proposal.
Black-faced Monarch (*Monarcha melanopsis*)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. *Summer breeding migrant to coastal south east Australia, otherwise uncommon*.	Suitable roosting, breeding and foraging habitat present. Most suitable areas of habitat are conserved within the north-eastern drainage line and Open Space portions of the subject site. Not likely to be significantly impacted by the proposal.

Common name *Scientific name*	Preferred habitat *Migratory breeding*	Comments
Spectacled Monarch (*Monarcha trivirgatus*)	Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. *Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept/Oct to May. Uncommon in southern part of range.*	Some suitable roosting, breeding and foraging habitat present. Most suitable areas of habitat are conserved within the north-eastern drainage line portions of the subject site. Not likely to be significantly impacted by the proposal.
Yellow Wagtail (*Motacilla flava*)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops. It nests in tussocks.	Sub-optimal foraging habitat present. Not likely to be significantly impacted by the proposal.
Satin Flycatcher (*Myiagra cyanoleuca*)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.*	Suitable roosting and foraging habitat present. Most suitable areas of habitat are conserved within the north-eastern drainage corridor portion of the subject site. Not likely to be significantly impacted by the proposal.
Rufous Fantail (*Rhipidura rufifrons*)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. *Breeding migrant to south east Australia over warmer months. Altitudinal migrant in north east NSW in mountain forests during warmer months.*	Suitable roosting, breeding and foraging habitat present. Most suitable areas of habitat will be conserved within the north-eastern portions of the drainage line. Not likely to be significantly impacted by the proposal.
Great Egret (*Ardea alba*)	Shallows of rivers, estuaries; tidal mudflats, freshwater wetlands; sewerage ponds, irrigation areas, larger dams, etc. *Dispersive; cosmopolitan.*	Very low potential foraging / nesting habitat present. Not recorded during survey. Not likely to be significantly impacted by the proposal.

Common name *Scientific name*	Preferred habitat *Migratory breeding*	Comments
Cattle Egret (*Ardea ibis*)	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats, drains. *Breeds in summer in warmer parts of range including NSW*.	Suitable foraging and low potential foraging / nesting habitat present. The proposed urban subdivision will remove foraging opportunity within the subject site however will not likely be significant given the extent of suitable habitat and recordings within the nearby locality. Not likely to be significantly impacted by the proposal.
Fork-tailed Swift (*Apus pacificus*)	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. *Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.*	Suitable foraging habitat present. Not recorded during survey. Not likely to be significantly impacted by the proposal.
Osprey (*Pandion haliaetus*)	Favours coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breeds from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	No suitable habitat is present within the subject site.

Nationally - Significant Impact Assessment

A2

Under the EPBC Act an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

The following significant impact criteria were sourced from the EPBC Act Policy Statement 1.1 (May 2006) and are assessed in accordance with the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Approved conservation advice (incorporating listing advice) for the Illawarra and south coast lowland forest and woodland ecological community (Department of Environment and Energy, 2016):

A2.1 CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *Lead to a long-term decrease in the size of a population;*
- *Reduce the area of occupancy of the species;*
- *Fragment an existing population into two or more populations;*
- *Adversely affect habitat critical to the survival of a species;*
- *Disrupt the breeding cycle of a population;*
- *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;*
- *Introduce disease that may cause the species to decline; or*
- *Interfere with the recovery of the species.*

>> What is a population of a species?

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- *a geographically distinct regional population, or collection of local populations; or*
- *a population, or collection of local populations, that occurs within a particular bioregion.*

>> What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:
• For activities such as foraging, breeding, roosting, or dispersal;
• For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
• To maintain genetic diversity and long term evolutionary development; or
• For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

Response

No Critically Endangered or Endangered species listed under the Commonwealth *EPBC Act* (1999) were observed within the subject site.

There is some potential habitat for the Critically Endangered species as listed in Table A2.1:

Table A2.1 - EPBC listed Critically Endangered or Endangered species with potential habitat onsite

Scientific name	EPBC Act Status	Potential to occur
Corunastylis insignis	CE	Moderate
Corunastylis sp. Charmhaven	CE	Low

Corunastylis insignis

This species is known from four localities between Chain Valley Bay and Wyong in Wyong local government area. A small population also occurs within Lake Macquarie LGA. This species grows in patches of *Themeda australis* (Kangaroo Grass) amongst shrubs and sedges in heathland and woodland. The presence of other orchid species and therefore micorrhyzal assemblages can, though not always, be an indication of suitable habitat. Associated vegetation at known populations is described as dry sclerophyll woodland dominated by *Eucalyptus haemastoma* (Scribbly Gum), *Corymbia gummifera* (Red Bloodwood), *Angophora costata* (Smooth-barked Apple) and *Allocasuarina littoralis* (Black She-oak). The species has been recorded in disturbed locations, including in areas lacking upper vegetation strata. Most sites have a mostly native understorey. Flowering period is typically from September to October, but has been recorded flowering in mid to late November to early December. Note, this species is extremely difficult to locate even when in flower and cannot be definitively identified from leaf alone. Local climatic conditions appears to play a key role in flowering events, with rainfall possibly driving flowering. In drier periods, initial signs of above ground activity may emerge (e.g. leaf and spike), though flowers have been observed to wither in the absence of suitable conditions (e.g. soil moisture).

There is some Moderate potential for *Corunastylis (Genoplesium) insigne* within the subject site which does contain sclerophyll woodland dominated by *Corymbia gummifera* (Red Bloodwood), *Angophora costata* (Smooth-barked Apple) and *Allocasuarina littoralis* (Black She-oak), but very few *Eucalyptus haemastoma* (Scribbly Gum). Detailed flora surveys

targeting this species have been undertaken during the September and October flowering period of this species by ELA and CEG on at least seven (7) occasions in 2012. Despite numerous detailed seasonally targeted searches, this species was not observed within the subject site.

***Corunastylis* sp. Charmhaven**

This species was discovered and listed as an EPBC Act critically endangered species in June 2014 which was after the reports by ELA and CEG were produced. TBE was engaged to undertake targeted searches for *Corunastylis* sp. Charmhaven during its flowering period from February to May 2018. To this end TBE contacted Central Coast Council (Evelyn Craigie – Ecologist Development Assessment Officer from Central Coast Council) to notify TBE when *Corunastylis* sp. Charmhaven was beginning to flower. This notification was duly received and targeted searches were undertaken within the subject site by TBE within a few days. A second search was undertaken another 14 days later.

Corunastylis sp. Charmhaven (NSW896673) is currently only known from the Central Coast LGA (formerly Wyong Shire) within NSW where it is restricted to a few locations in the Charmhaven, Warnervale and Tooheys Road (Bushells Ridge) areas.

Corunastylis sp. Charmhaven occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include Black She-oak (*Allocasuarina littoralis*), Prickly Tea-tree (*Leptospermum juniperinum*), Prickly-leaved Paperbark (*Melaleuca nodosa*), Narrow-leaved Bottlebrush (*Callistemon linearis*) and Zig-zag Bog-rush (*Schoenus brevifolius*).

There is a Low potential for *Corunastylis* sp. Charmhaven to occur within the subject site due to the lack of habitat attributes such as low woodland to heathland with a shrubby understorey and ground layer dominated by Black She-oak (*Allocasuarina littoralis*), Prickly Tea-tree (*Leptospermum juniperinum*) and other species as mentioned above. This species has been recorded in close proximity to the south-west of the subject site (OEH Bionet 2018), however these locations appear to have contained low moist shrubby vegetation prior to the works currently being undertaken within Stages 1 to 4 on adjoining lands.

It is considered that the potential for this species to occur within the subject site is low. The area most likely to support this species is the drainage line which runs to the north-east. This drainage line vegetation is to be retained, thereby conserving the most likely area of potential habitat within the site. It is also recommended elsewhere within this assessment that a Vegetation Management Plan (VMP) be produced for the site to retain, manage, maintain or improve the extent and quality of the retained vegetation within the subject site.

With regard to the criteria to be assessed for a Critically Endangered or Endangered species such as *Corunastylis insignis* and *Corunastylis* sp Charmhaven, the following assessment is supplied:

• Lead to a long-term decrease in the size of a population;

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. In both cases the habitat within the subject site for these species is considered to be marginal quality and in the case of *Corunastylis* sp Charmhaven is of low quality and very limited in size. Due to the lack of observations of these species within the subject site, the conservation of the drainage line vegetation within the subject site and the presence of known populations of these species in the locality, it is considered that the proposal will not lead to a long-term decrease in the size of the population of these species.

• Reduce the area of occupancy of the species;

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. Therefore, it is considered that the proposed action is unlikely to reduce the area of occupancy of these species.

• Fragment an existing population into two or more populations;

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. Therefore, it is considered that the proposed action is unlikely to result in the fragmentation of existing populations of these species.

• Adversely affect habitat critical to the survival of a species;

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. In addition, the habitat present within the subject site for *Corunastylis insignis* was considered to be of Moderate potential, while habitat for *Corunastylis* sp. Charmhaven was considered to be of Low potential. Therefore, it is considered that the proposed action is unlikely to adversely affect habitat critical to the survival of these species

• Disrupt the breeding cycle of a population;

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. In addition, the habitat present within the subject site for *Corunastylis insignis* was considered to be of Moderate potential, while habitat for *Corunastylis* sp. Charmhaven was considered to be of Low potential. Due to the lack of sightings of these species and the Low to moderate habitat potential for these species, it is considered that the proposed action is unlikely to disrupt the breeding cycle of these species populations.

• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

It is considered that the proposed action is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline. This is due to the absence of *Corunastylis insignis* or *Corunastylis* sp Charmhaven observations within the subject site despite multiple detailed targeted and intensive searches during each species flowering period.

• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;

The proposed action will retain some native vegetation containing some potential habitat for *Corunastylis insignis* and *Corunastylis* sp Charmhaven. It is also recommended that a Vegetation Management Plan (VMP) be produced to manage the vegetation within the site. This VMP is expected to include strategies, methodology and target species information for site-wide weed control. Therefore, it is considered that the proposed action is unlikely to result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

• Introduce disease that may cause the species to decline; or

It is recommended that a Vegetation Management Plan (VMP) be produced to manage the vegetation within the site. This VMP is expected to include strategies, methodology and protocols for site-wide prevention or control of diseases and pathogens that may impact on *Corunastylis insignis* or *Corunastylis* sp Charmhaven, or their habitats.

• Interfere with the recovery of the species.

Neither *Corunastylis insignis* nor *Corunastylis* sp Charmhaven were observed within the subject site despite detailed targeted and intensive searches during each species flowering period. The proposed action is unlikely to interfere with the recovery of these species.

A2.2 VULNERABLE SPECIES

Significant impact criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species;*
- *reduce the area of occupancy of an important population;*
- *fragment an existing important population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of an important population;*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;*
- *introduce disease that may cause the species to decline; or*
- *interfere substantially with the recovery of the species.*

>> What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- *Key source populations either for breeding or dispersal;*
- *Populations that are necessary for maintaining genetic diversity; and/or*
- *Populations that are near the limit of the species range.*

Response

Vulnerable Species listed under the Commonwealth EPBC Act (1999) were not observed within the subject site. However, a number of vulnerable species were considered to have various levels of potential habitat within the site. These species are listed in Table A2.2 below.

Table A2.2 – EPBC listed Vulnerable species with potential habitat onsite

Scientific name	EPBC Act Status	Potential to occur
Rutidosis heterogama	V	High
Tetratheca juncea	V	Moderate
Acacia bynoeana	V	Moderate
Cryptostylis hunteriana	V	Low
Angophora inopina	V	Low
Caladenia tessellata	V	Very Low
Grey-headed Flying-fox	V	Foraging Only

Rutidosis heterogama

This species has been recorded from near Cessnock to Kurri Kurri with an outlying occurrence at Howes Valley. On the Central Coast it is located north from Wyong to Newcastle.

It grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides.

A large population of this species is located approximately 80 metres to the west of the subject site. This population is located within the railway corridor and in other areas to the west of the rail corridor.

Detailed searches along the eastern fenceline of the rail corridor (west of the subject site) did not observe any *Rutidosis heterogama* specimens east of the railway corridor. Likewise detailed searches throughout the subject site on numerous (at least eight) occasions by ELA, CEG and TBE have failed to locate any specimens of this species within the subject site.

Despite multiple detailed flora searches by ELA, CEG (2012) and TBE (2017-18) this species was not observed within the subject site. Considering the large population of this species located in close proximity to the west of the subject site, the reasons for no sightings are not known, however it may have been impacts from past land clearing and long-term land uses and regrowth, or, the population along the railway cutting is derived from the recent arrival of this species within the immediate locality.

Tetratheca juncea

Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock.

It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest.

The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. It generally prefers well-drained sites below 200m elevation and annual rainfall between 1000 - 1200mm. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral.

It usually spreads via underground stems which can be up to 50 cm long. Consequently, individual plants may be difficult to identify.

Tetratheca juncea also reproduces sexually but this requires insect pollination by a specialist insect which is thought to be a Carpenter Bee which can land upside-down in order to pollinate the flowers which open downwards towards the ground and are thus inaccessible to common pollinators.

Despite multiple seasonal surveys of the subject site by ELA, CEG (both 2012) and TBE (2017 and 2018) this species has not been detected within the subject site. The preferred substrate for this species (the Awaba soil landscape) is not present within the subject site.

Acacia bynoeana

This species flowers anytime from September to March. *Acacia bynoeana* is known from central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The species is currently known from about 30 locations, with the size of the populations at most locations being very small (1-5 plants).

Acacia bynoeana occurs in heath or dry sclerophyll forest on sandy soils. It seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.

Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.

Despite multiple seasonal surveys of the subject site by ELA, CEG (both 2012) and TBE (2017 and 2018) this species has not been detected within the subject site.

Cryptostylis hunteriana

This species flowers between November and February and has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park.

C. hunteriana does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black She-oak (*Allocasuarina littoralis*). It appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).

Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material.

In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site.

The vegetation communities within the subject site only contain some of the associated species such as Red Bloodwood (*Corymbia gummifera*) and Black She-oak (*Allocasuarina littoralis*). Despite multiple seasonal surveys of the subject site by ELA, CEG (both 2012) and TBE (2017-18) this species has not been detected within the subject site. Known conserved locations of this species are present within the region within Munmorah State Conservation Area and Ku-Ring-Gai Chase National Park.

Angophora inopina

This species is endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. There is an unconfirmed record of the species near Bulahdelah. Approximately 1250 ha of occupied habitat has been mapped in the Wyong–southern Lake Macquarie area.

Angophora inopina occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia–Banksia oblongifolia* wet heath; (iii) *Eucalyptus resinifera–Melaleuca*

sieberi–Angophora inopina sedge woodland; (iv) *Eucalyptus capitellata–Corymbia gummifera–Angophora inopina* woodland/forest.

Flowering appears to take place principally between mid-December and mid-January, but is generally poor and sporadic.

Preliminary experiments indicate that neither pollination nor seed viability are limiting factors in the life cycle.

The closest record of this species is from 2005 and is located 1.5 km West of the subject site. Despite multiple surveys of the subject site by ELA, CEG (both 2012) and TBE (2017-2018) this species has not been detected within the subject site.

Caladenia tessellata

Caladenia tessellata (Thick Lip Spider Orchid) is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW.

It is generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.

The single leaf regrows each year.

Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).

The closest record of this species is from 1953 and is located 4 km South-west of the subject site. Despite multiple seasonal surveys of the subject site by ELA, CEG (both 2012) and TBE (2017 and 2018) this species has not been detected within the subject site.

Grey-headed Flying-fox

Grey-headed Flying-foxes (GHFF) are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.

GHFF occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. They roost in camps that are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Site fidelity to camps is high; some camps have been used for over a century.

GHFF can travel up to 50 km from the camp to forage areas; commuting distances are more often <20 km. They feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.

Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.

It is considered that the Grey-headed Flying-fox may utilise the subject site on an opportunistic basis for foraging in the canopy during tree flowering times. There is no evidence of a GHFF camp within the subject site or in the immediate locality, therefore the subject site is not used for breeding or roosting.

With regard to the criteria to be assessed for vulnerable species such as *Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata, Cryptostylis hunteriana,* and Grey Headed Flying Fox, the following assessment is supplied:

• lead to a long-term decrease in the size of an important population of a species;

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- *Key source populations either for breeding or dispersal;*
- *Populations that are necessary for maintaining genetic diversity; and/or*
- *Populations that are near the limit of the species range.*
- *reduce the area of occupancy of an important population;*

Despite detailed targeted searches on multiple seasonal occasions within the subject site by ELA (2012), CEG (2012 and TBE (2017-18), no specimens of *Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata* or *Cryptostylis hunteriana* were observed within the subject site. It was determined that the site provides only suitable foraging habitat for the Grey-headed Flying-fox.

The subject site does not provide key breeding or dispersal habitat, populations that are necessary for maintaining genetic diversity or that are near the limit of their known species range. Nor does the proposed action within the subject site reduce the area of occupancy of any important population.

Therefore it is considered that the subject site does not contain or provide exclusive habitat for any 'important population' as defined above.

• fragment an existing important population into two or more populations;

It is considered that the subject site does not contain or provide exclusive habitat for any 'important population'. Therefore, the proposed action is unlikely to fragment an existing important population into two or more populations

• adversely affect habitat critical to the survival of a species;

Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata, *Cryptostylis hunteriana* and the Grey-headed Flying-fox have all been recorded widely in the region. No areas of habitat suitable for, or essential, for the survival of these species has been declared. Therefore, it is considered that the proposed action will not adversely affect habitat critical to the survival of any species.

• disrupt the breeding cycle of an important population;

The proposed action within the subject site will not disrupt the breeding cycle of any important populations as explained in point one. Nor will it disrupt the breeding cycle of *Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata*, *Cryptostylis hunteriana* or the Grey-headed Flying-fox.

• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata and *Cryptostylis hunteriana* have not been observed within the subject site. It is considered that the subject site provides only potential foraging habitat for the Grey-headed Flying-fox. Therefore it is considered that the proposed action will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that any species is likely to decline.

- ***result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;***

The proposed action within the subject site may provide an opportunity to manage any retained areas of bushland. This will require the production of a Vegetation Management Plan (VMP) to retain, manage, and improve the quality and extent of retained native vegetation. It is expected that a VMP will include strategies, methods and instructions on how to control invasive plant and feral fauna species. Therefore strategies and management strategies can be enacted which will prevent or control invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

- ***introduce disease that may cause the species to decline;***

It is considered that the proposed action is unlikely to introduce diseases that may cause the EPBC listed vulnerable species to decline.

Nonetheless, diseases such as Phytophthora, Psittacine circoviral (Beak and Feather) disease, Infection of frogs by amphibian chytrid, and Exotic Rust Fungi of the order Pucciniales upon Myrtaceae species may have a very small chance to occur. It is recommended that protocols and actions be in place during the construction phase of the proposed development be implemented to prevent the entry of these diseases into the subject site.

- ***interfere substantially with the recovery of the species.***

Acacia bynoeana, Angophora inopina, Rutidosis heterogama, Tetratheca juncea, Caladenia tessellata, *Cryptostylis hunteriana* or the Grey-headed Flying-fox were not observed within the subject site. It is considered that the subject site provides only opportunistic foraging habitat for the Grey-headed Flying-fox. Therefore, it is considered that the proposed action is unlikely to interfere substantially with the recovery of these species.

A2.3 CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

No Critically Endangered or Endangered ecological communities listed under the Commonwealth *EPBC Act* (1999) were observed within the subject site.

A2.4 MIGRATORY SPECIES

Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;*
- *Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or*
- *Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

>> What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or
c) Habitat utilised by a migratory species which is at the limit of the species range; and/or
d) Habitat within an area where the species is declining.

>> What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

>> What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

Response

No migratory species listed under the Commonwealth *EPBC Act* (1999) were observed within the subject site. However, it is considered that the subject site may provide some occasional or opportunistic foraging habitat for many of the migratory species listed in Table A1.3.

Migratory species known in the area that were not observed onsite either had no suitable habitat within the site, or if they did, this habitat would be used for foraging on an opportunistic basis and would not be 'important habitat' as defined above. In addition, the subject site is not considered to provide habitat for any ecologically significant proportion of any migratory population. Therefore, the proposed action is not likely to significantly impact these migratory species.

Conclusion of the EPBC Act significance assessment

It is considered that the proposed Warnervale Town Centre subdivision and development within Stages 5 to 10 (the subject site) is unlikely to have a significant impact on matters of National Environmental Significance (NES). As such, a referral to the Department of Environment and Energy (DoEE) is not required.