Our ref: PS119032-ECO-LTR- RevB

By email
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Dear Diana

EPBC Act condition assessment of Illawarra Subtropical Rainforest in the Sydney Basin Bioregion at Spring Creek Kiama (Lot 2/ DP805229)

1. PROJECT BACKGROUND

1.1 PROJECT DETAILS

APP Corporation Pty Limited (APP) have submitted a re-zoning application for a parcel of land at Dido Street in Spring Creek NSW (Lot 2/DP805229), hereby referred to as the site.

In 2018, WSP undertook an ecological opportunities and constraints assessment for a broader area which encompassed the site. This assessment identified a threatened ecological community listed as Endangered under the *NSW Biodiversity Conservation Act 2016* (BC Act), *Illawarra Subtropical Rainforest in the Sydney Basin Bioregion*, as occurring on the site. On 5 September 2019, after WSP's initial assessment, this ecological community was listed as part of the Critically *Endangered Illawarra–Shoalhaven subtropical rainforest of the Sydney Basin Bioregion* under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The rezoning application is seeking to rezone a 0.27 ha portion of the site from RU1 Primary Production to R2 Low Density Residential. The application received a Gateway Determination in 2019 requesting that two areas in the site (investigation area), which comprise of Illawarra Subtropical Rainforest, be rezoned to E2 – Environmental Conservation due to the new EPBC Act listing status.

1.2 ILLAWARRA–SHOALHAVEN SUBTROPICAL RAINFOREST COMMUNITY DESCRIPTION

The ecological community combines two New South Wales (NSW) state listed endangered ecological communities: The '*Illawarra subtropical rainforest in the Sydney Basin Bioregion'* (NSW Scientific Committee 2002a) and the '*Milton Ulladulla subtropical rainforest in the Sydney Basin Bioregion*' (NSW Scientific Committee 2002b).

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The ecological community is closely associated with topographically more sheltered sites and with more fertile (relatively high-nutrient) soils with greater water-holding capacity. It typically occurs on fertile volcanic soils; and also, on other relatively high-nutrient soils on escarpment benches and in sheltered gullies.

The ecological community is typically a dense, complex rainforest when mature (12 to 25 m tall), with an emergent tree layer up to 35 m or more in height. In some circumstances, e.g. on dry, rocky sites, the canopy may be shorter. The ecological community is characterised by its relatively high structural and floristic diversity. At a local scale, its expression/structure can vary depending on soil fertility and also moisture availability (due to either rainfall, aspect, topographic position or soil depth), or some combination of these factors.

Tree species with compound leaves are common and leaves are relatively large (notophyll to mesophyll). There is a relatively low abundance of species from the genera *Syncarpia, Acacia, Banksia* and *Eucalyptus* (unlike the Littoral Rainforest and Vine Thickets ecological community, where these genera may be more commonly present). Buttresses may be common, and vines may be diverse and abundant.

1.3 PURPOSE OF THIS REPORT

The purpose of this letter is to validate the extent and condition of the *Illawarra – Shoalhaven Subtropical Rainforest* threatened ecological community against the EPBC Act condition criteria and based on this analysis to provide advice on if the areas identified in the gateway determination warrant E2 rezoning for their association with high ecological values characterised by the EPBC Act listed *Illawarra – Shoalhaven Subtropical Rainforest* threatened ecological community.

2. METHODS

The field investigation undertaken for this condition assessment were conducted over one day of survey 26/02/2020 by one Ecologist. These field survey focussed on verifying the vegetation and condition of the investigation areas identified by council as potentially warranting E2 zoning.

Vegetation integrity plots were undertaken to validate the extent and condition of the ecological community against the EPBC Act condition criteria; following the Biodiversity Assessment Methodology as required for assessment under the new *Biodiversity Conservation Act 2016* (BC Act).

A total of two vegetation integrity plots, were conducted during the field assessment, as depicted on Figures 1. Historical data from the vegetation integrity plots collected during the Dido Street, Spring Creek Ecological Opportunities and Constraints Assessment (WSP 2018) have been included where relevant.

3. RESULTS AND CONDITION ASSESSMENT

3.1 EXISTING ENVIRONMENT

A review of the Dido Street, Spring Creek Ecological Opportunities and Constraints Assessment (WSP 2018) identified that the site supports remnants of Whalebone Tree – Native Quince dry subtropical rainforest (PCT 1300) which is consistent with Illawarra subtropical rainforest in the Sydney Basin bioregion, listed as Endangered under the NSW BC Act.

Within the site, the vegetation consists of grazed open grassland dominated by exotic species dotted with remnant rainforest species such as *Livistona australis* and *Ficus* spp. Small patches of low forest/shrubland occur on the north eastern boundary and north western boundary (Figure 1). These patches and adjacent areas were identified by Council as potentially warranting an E2 zoning (investigation area).

The patch size of the vegetation was assessed through desktop assessment of aerial photography and vegetation mapping as well as limited ground truthing of vegetation in the immediate vicinity.

3.1.1 NORTH WESTERN SECTION

The forest vegetation in the western section is contiguous with vegetation to the west of the site, forming a patch that is greater than 1 ha in size. The margins of this forest are dominated by exotic species including *Olea europea* ssp. *cuspidata, Lantana* spp., *Rubus* sp. and exotic grasses including *Ehrharta erecta* and P*aspalum dilatatum*. The north western remnant is dominated by *Notolaea venosa, Pittosporum undulatum, Glochidion ferdinandi* and *Ficus macrophylla*.

3.1.2 NORTH EASTERN SECTION

The forest vegetation in the north eastern section of the site is contiguous with vegetation outside the site, however much of this vegetation and nearby vegetation is dominated by introduced species including *Olea europea* ssp. c*uspidata* and *Erythrina x Skyessii* and separated from other remnants by exotic grassland (Photo 3.1). The size of this vegetation area is 0.1-1 ha.

The north eastern patch is dominated by *Olea europea* ssp. *cuspidata* and *Notolaea venosa* with emergent *Acacia maidenii.* The margins of this patch, including the investigation areas, consisted of *Olea europea* ssp. *cuspidata* overstorey and groundcover of exotic grasses including *Ehrharta erecta* with low diversity of native understorey species including *Hibbertia scandens, Pseuderanthemum variabile* and *Pittosporum species.*

Photo 3.1 Exotic grassland with patches of shrubs in north eastern section

3.2 IDENTIFYING AREAS OF ILLAWARRA-SHOALHAVEN SUBTROPICAL RAINFOREST

Protection as a matter of national environmental significance (MNES) under national environment law, is limited to areas of the ecological community that meet the Key diagnostic characteristics and at least the minimum condition thresholds (Moderate or High Condition classes) that are listed in the *Conservation Advice (incorporating listing advice) for the Illawarra-Shoalhaven subtropical rainforest of the Sydney Basin Bioregion* (DoEE 2019).

The Key diagnostic characteristics, Contra-indicators, Condition thresholds have been used in the following sections to:

- identify patches of the threatened ecological community that are protected under national environment law;
- distinguish the ecological community from other similar vegetation types nearby and,
- distinguish between patches of different quality

These criteria have been summarised and assessed in Table 3.1.

3.3 KEY DIAGNOSTIC CHARACTERISTICS AND CONTRA-INDICATORS

The ecological community that is protected under national environment law consists of areas of vegetation (and associated biota) that overall, meet the following Key diagnostic characteristics.

Table 3.1 KEY DIAGNOSTIC CHARACTERISTICS CONTRA-INDICATORS

ATTRIBUTE	LISTING ADVICE KEY DIAGNOSTIC CHARACTERISTICS AND CONTRA-INDICATORS	COMMENT
KEY DIAGNOSTIC CHARACTERISTICS		
Locality	It occurs in the Sydney Basin Bioregion. It occurs in the Illawarra, Jervis and Sydney Cataract subregions, and just over the borders into Burragorang, Moss Vale and Ettrema subregions; it may occur elsewhere in the Sydney Basin Bioregion.	The site occurs within the Sydney Basin IBRA16 Bioregion
Landscape position	It occurs on the coastal plain, low-lying foothills and slopes, benches and drainage lines of the eastern coastal escarpment (and of some coastal mountains), between the Hacking and Clyde rivers. It includes occurrences in the Hacking River catchment and the Ettrema Region, as well as in Kangaroo Valley and sites around Milton and Ulladulla.	The site occurs near a drainage line, on a coastal plain
Elevation	It is usually found below 350 m above sea level (ASL); but there are occurrences up to around 550 – 600 m ASL, for example around Cambewarra Mountain.	The site ranges from 2m – 10m AHD

ATTRIBUTE	LISTING ADVICE KEY DIAGNOSTIC CHARACTERISTICS AND CONTRA-INDICATORS	COMMENT
Geology	Typically associated with the more fertile soils derived from igneous substrates but may occur on other substrates (such as the enriched high nutrient colluvial soils on benches of the escarpment – and in deep, sheltered gullies.	Soils onsite are classified as a Ferrosol by ASRIS (Australian Soil Resource Information System)
Structural Complexity and Regeneration	Relatively undisturbed stands typically have high structural complexity with a canopy and emergent trees (sometimes with buttressed trunks), epiphytes, mid-stratum trees and shrubs, vines in the canopy and on tree trunks and on the ground; and a variable ground layer, usually with abundant leaf litter. At disturbed sites structural complexity may be reduced, but there may be signs of regeneration (e.g. seedlings, saplings or other sub-mature stages of rainforest species)	Relatively disturbed within the site. Limited structural complexity. Canopy and emergent species largely absent. However, vines present and some signs of regeneration despite ongoing grazing.
Canopy Cover	The canopy of relatively undisturbed mature patches generally forms a dense closed forest (typical canopy cover of at least 70%) with some emergent trees (e.g. to 35 m high); although gaps may be present and are included in the patch. At some sites canopy cover may be reduced e.g. due to landscape features (such as large boulders or creeks) or disturbance.	Canopy and emergent species largely absent. The vegetation onsite has a canopy cover (predominantly tall shrubs) of up to 50% cover including exotic species.
Ground Cover	Whilst the ecological community typically has a mid-stratum (mid-layer / midstorey vegetation), ground layer vegetation is often sparse (although some areas may have a high percentage cover of ferns, which can fluctuate with seasonal conditions from year to year).	Groundlayer is variable and consists of bare ground, rocks as well as areas dominate by ferns.
Species Richness	A list of diagnostic native plant species, and of some of the key native fauna that make up the ecological community is given at Attachment A; although particular species may be abundant or rare, or not necessarily present at every site.	The diagnostic native plant species that make up the ecological community are assessed in Table 3.3 and Attachment B.
CONTRA-INDICATORS		
Rainforest characterised by a single relatively uniform canopy layer, (e.g. with no midstorey), a persistent fern-dominated ground layer and/or an absence of large vines or lianas, is unlikely to be the Illawarra–Shoalhaven subtropical rainforest ecological community		The vegetation community onsite does not exhibit a single relatively uniform canopy layer. While patches of ferns are present, this is considered consistent with the community.

ATTRIBUTE	LISTING ADVICE KEY DIAGNOSTIC CHARACTERISTICS AND CONTRA-INDICATORS	COMMENT
The ecological community is not dominated *by Backhousia myrtifolia* (Grey Myrtle), i.e. *Backhousia myrtifolia* should account for less than half of the total canopy cover within a patch of the ecological community.		The vegetation community on site is not dominated by *Backhousia myrtifolia* (Grey Myrtle).
The ecological community is not a woodland or forest characterised by eucalypts (i.e. tree species from the genera *Eucalyptus, Corymbia, Syncarpia* and *Angophora*).		The vegetation community onsite is not a woodland or forest characterised by eucalypts.
The ecological community is unlikely to occur on relatively infertile, coarse-textured quartz-based geologies and soils, such as coastal sands		The vegetation community onsite occurs on relatively fertile Ferrosols
CONCLUSION PCT1300 identified on site generally meets key diagnostic indicators for the EPBC ACT listed ecological community. Consistency with EPBC Act listed community requires assessment against condition thresholds (Section 3.4).		

3.4 CONDITION THRESHOLDS

The results of the field assessment are shown in Table 3.3 and assessed against the requirements to meet condition classes and thresholds for the Illawarra–Shoalhaven Subtropical Rainforest Community (Table 3.2). All the required parameters (patch size, canopy cover etc.) must be met in order to achieve the relevant condition class.

Very small (< 0.1 ha), isolated patches and/or those subject to high disturbance are unlikely to have the structure, composition and function of the ecological community and will not meet the minimum condition thresholds for protection under national environment law (for example, a few rainforest trees on a farm or roadside, with limited diversity/structural elements). The ecological community that is protected under national environment law comprises patches that meet the Key diagnostic characteristics (above) and at least the minimum condition thresholds (Moderate and High condition categories A, B, C or D).

Table 3.2 Condition thresholds for the Illawarra-Shoalhaven subtropical rainforest

Class, category and rationale	Patch size thresholds	Biotic thresholds
Moderate Condition Class: i.e. for patches of the ecological community that meet the minimum condition thresholds for protection under national environment law.		
Moderate Condition – Category A A larger rainforest patch with a moderate to intact canopy.	At least 1 ha.	At least 50% canopy cover[1] **AND** A minimum of 5 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch.
Moderate Condition – Category B A smaller rainforest patch with a moderate to intact canopy; AND either a higher diversity of rainforest plants, OR it is part of a larger patch of native vegetation.	Between 0.1 and 1 ha.	At least 50% canopy cover[1] **AND** A minimum of 15 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch **OR** A minimum of 10 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch **AND** The patch is contiguous[4] with another patch of native vegetation that is at least 1 ha in size.
Moderate Condition – Category C A smaller rainforest patch with a relatively intact canopy AND a moderate diversity of rainforest plants.	At least 0.1 ha.	At least 70% canopy cover[1] **AND** A minimum of 10 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch.
Regenerating rainforest – Category D A regenerating rainforest patch that has a higher diversity of rainforest species.	At least 0.1 ha.	At least 30% canopy cover[1]; **AND** A minimum of 15 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch **AND** Evidence of regeneration (e.g. seedlings, saplings or other sub-mature stages of rainforest tree species).
High Condition Class: e.g. to provide further information about higher condition patches & / or to guide management and restoration goals		
High Condition – Category A A patch with a relatively intact canopy AND a higher diversity of rainforest plants.	At least 0.1 ha.	≥ 70% canopy cover[1] **AND** A minimum of 15 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch
High Condition – Category B A patch with a relatively intact canopy AND a moderate diversity of rainforest plants AND specialist subtropical rainforest birds OR a moderate diversity of native birds (given their important role in the EC).	At least 0.1 ha.	At least 70% canopy cover[1] **AND** A minimum of 10 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch **AND** At least 2 'specialist[#] subtropical rainforest' native bird species from Table A2 in the patch **OR** At least 10 native bird species from Table A2 in the patch.
High condition – Category C A patch with a moderate canopy and an even higher diversity of rainforest plants	At least 0.1 ha.	At least 50% canopy cover[1] **AND** A minimum of 30 native plant species from Table A1 per 0.04 ha sample plot[2] on average[3] for the patch.

Table 3.3 Condition assessment to meet the minimum condition thresholds for protection under national environment law

AREA	PLOTS	PATCH SIZE	CANOPY COVER[1,4]	FLORA SPECIES RICHNESS[2,4]	REGENERATION[3]	CONCLUSION
North eastern section	R3, R7	At least 0.1ha	33.6%	13.5	Yes	Not sufficient condition to meet EPBC Act definition based on canopy cover.
North western section	R6	At least 1 ha	52%	15	Yes	Consistent with EPBC Act definition, based on canopy cover and species richness. Moderate condition-category A

1. Canopy cover include emergents, canopy and the subcanopy layer
2. The average flora species per 0.04ha sample plot required to meet the determination of the Illawarra–Shoalhaven subtropical rainforest ecological community are listed in Attachment A
3. Evidence of regeneration (e.g. seedlings, saplings or other sub-mature stages of rainforest tree species).
4. Average of plots

4. CONCLUSION

The native vegetation within the site associated with the PCT 1300 contains "key diagnostic characteristics" of the EPBC Act listed Illawarra- Shoalhaven subtropical rainforest, however, more detailed assessment against the EPBC Act condition thresholds for the community indicate that:

- The north eastern patch was not in moderate or high condition as defined by the EPBC Act listing and is therefore not consistent with the nationally protected ecological community.
- The north western patch of vegetation was consistent with moderate condition – category A and therefore was consistent with EPBC Act listed community.

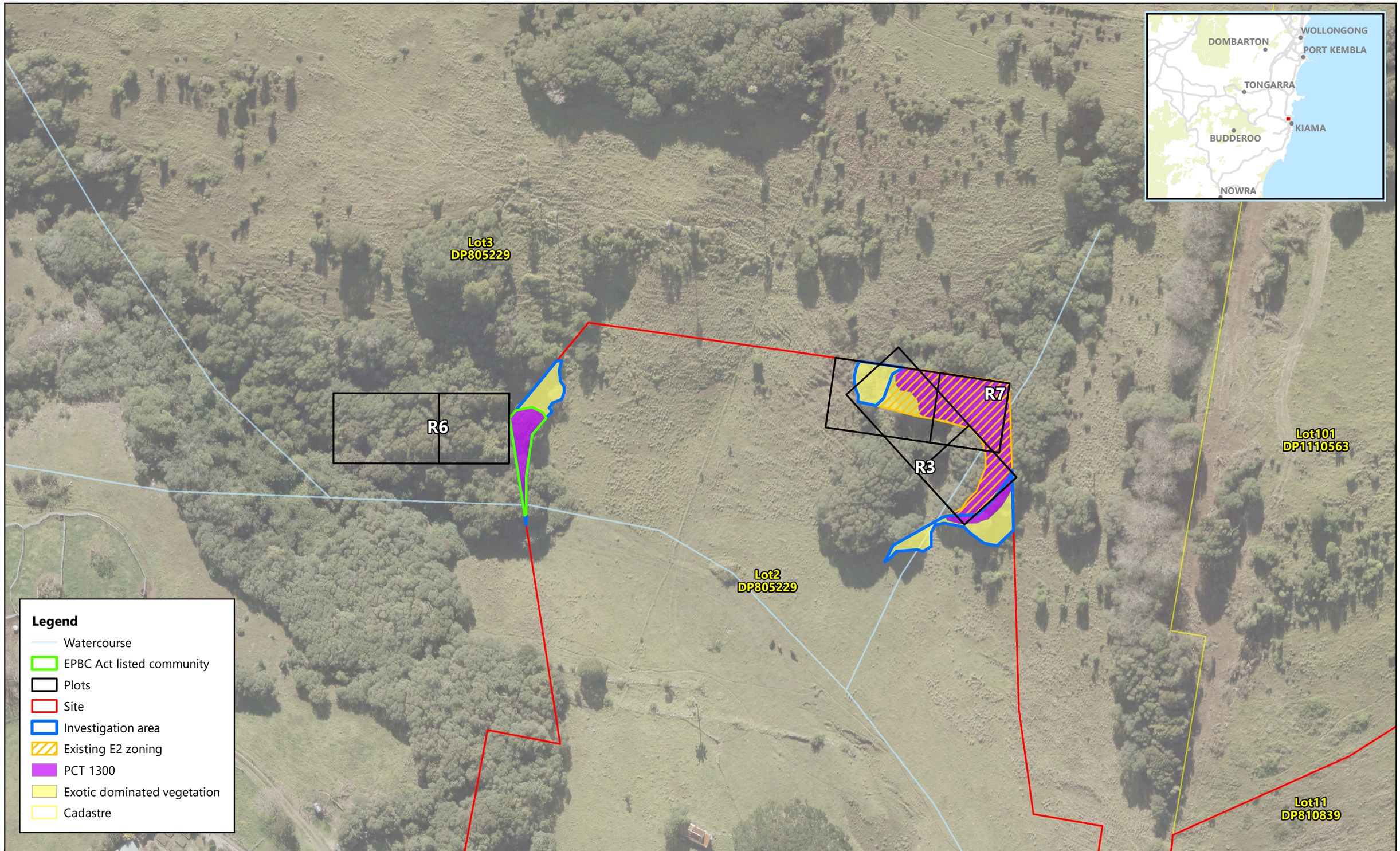
The investigation areas in the north east were not of sufficient ecological condition to warrant E2 zoning due to dominance of exotic species and the overall patch (already included in E2 zoning) not being of sufficient condition to be consistent with EPBC Act listing.

Native vegetation in the north west would be consistent with E2 zoning due to its consistency with EPBC Act listed community and therefore high ecological value.

The extent of the patches (native dominant areas) was mapped as well as the extent of vegetation consistent with EPBC Act listed Illawarra- Shoalhaven subtropical rainforest community (Figure 1).

5. REFERENCES

Department of the Environment and Energy (2019). *Conservation Advice (incorporating listing advice) for the Illawarra-Shoalhaven subtropical rainforest of the Sydney Basin Bioregion*. Canberra: Department of the Environment and Energy. Available From: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/148-conservation-advice.pdf.



Map: PS119032_GIS_001_A	Author: J. Greaves
Date: 11/03/2020	Approved by: S. Harrington

Data source: Department of Finance, Services and Innovation 2017; Metromap aerial survey (2019)

0 10 20 m

1:1,000

Coordinate system: GDA 1994 MGA Zone 56
Scale ratio correct when printed at A3

Dido Street, Spring Creek - Ecological Constraints Assessment
Figure 1

Illawarra-Shoalhaven Subtropical Rainforest

ATTACHMENT A
ILLAWARRA–SHOALHAVEN SUBTROPICAL RAINFOREST SPECIES LISTS

APPENDIX A: SPECIES LISTS

Table A1: Flora of the Illawarra–Shoalhaven subtropical rainforest.

Diagnostic native plant species based on Final Determination lists of characteristic species for the two related NSW-listed subtropical rainforest ecological communities (NSW Scientific Committee 2002a; 2002b), in addition to other native plant species occurring in greater than 10% of sample plots across the range of the Illawarra–Shoalhaven subtropical rainforest ecological community (analysis of NSW Plant Community Type plot data most related to the ecological community, 2019 unpublished). 10% frequency was considered an appropriate threshold to identify key species of the ecological community, given the list encompasses sites with moisture gradients from drier lowland sites, to more moist sites on the escarpment, and the north-south gradient/range. This table is referred to in Section 3.2 Step 2 – Determine patch condition.

Note:

- Patches may not include all species on the list, or may include other species not listed. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.
- The table is ordered by scientific name. Scientific names below reflect updated nationally accepted species' taxonomy as at April 2019.
- 'Broad growth form category' – as specified in the NSW Biodiversity Assessment Methodology (as at March 2019).

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Shrub	Straggly Lantern-bush, Lantern Bush	Malvaceae	*Abutilon oxycarpum*		
Tree	Maiden's Wattle	Mimosoideae	*Acacia maidenii*		
Tree	Blackwood	Mimosoideae	*Acacia melanoxylon*		
			Acmena smithii – see *Syzygium smithii*, below		
Shrub to Tree	White Aspen, Yellow Wood	Rutaceae	*Acronychia oblongifolia*		
Fern	Common Maidenhair	Pteridaceae	*Adiantum aethiopicum*		
Fern	Black Stem, Black Stem Maidenhair, Giant Maidenhair	Pteridaceae	*Adiantum formosum*		Yes
Fern	Rough Maidenhair Fern	Pteridaceae	*Adiantum hispidulum*		

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Shrub	Native Quince, Wild Quince, Bird's Eye	Sapindaceae	*Alectryon subcinereus*	Yes	Yes
Tree	Red Ash	Rhamnaceae	*Alphitonia excelsa*		Yes
Forb	–	Commelinaceae	*Aneilema acuminatum*		
Other	Gum Vine	Aphanopetalaceae	*Aphanopetalum resinosum*	Yes	
Fern	–	Tectariaceae	*Arthropteris tenella*	Yes	
Fern	Bird's Nest Fern	Aspleniaceae	*Asplenium australasicum*		
Fern	Necklace fern	Aspleniaceae	*Asplenium flabellifolium*	Yes	
Shrub	Grey Myrtle, Ironwood	Myrtaceae	*Backhousia myrtifolia*		
Tree	Brush Bloodwood, Ivory Birch, Scrub Bloodwood	Euphorbiaceae	*Baloghia inophylla*	Yes	Yes
Fern	Prickly Rasp Fern	Blechnaceae	*Blechnum neohollandicum*	Yes	Yes
Tree	Flame Tree, Illawarra Flame Tree	Malvaceae	*Brachychiton acerifolius*		Yes
Shrub	Coffee Bush	Phyllanthaceae	*Breynia oblongifolia*	Yes	
Shrub	Willow Bottlebrush	Myrtaceae	*Callistemon salignus*		
Grass & grasslike	Staff Climber	Cyperaceae	*Carex longebrachiata*		
Other	Native Grape	Vitaceae	*Cayratia clematidea*		Yes
Other	Staff Climber	Celastraceae	*Celastrus australis*		Yes
Other	Kangaroo Vine, Water Vine	Vitaceae	*Cissus antarctica*	Yes	Yes
Other	Water Vine	Vitaceae	*Cissus hypoglauca*	Yes	
Shrub	Brittlewood	Euphorbiaceae	*Claoxylon australe*	Yes	
Tree	Hairy Clerodendrum, Downy Chance Tree	Lamiaceae	*Clerodendrum tomentosum*		
Forb	–	Commelinaceae	*Commelina cyanea*		
Shrub	Green Native Cascarilla	Euphorbiaceae	*Croton verreauxii*		

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Tree	Jackwood	Lauraceae	*Cryptocarya glaucescens*		
Tree	Murrogun	Lauraceae	*Cryptocarya microneura*		
Grass & grasslike	–	Cyperaceae	*Cyperus tetraphyllus*		
Tree	Giant Stinging Tree	Urticaceae	*Dendrocnide excelsa*	Yes	Yes
Forb	Kindey Weed, Yilibili (D'harawal)	Convolvulaceae	*Dichondra repens*		
Shrub	Black Plum, Yellow Persimmon, Grey Plum	Ebenaceae	*Diospyros australis*	Yes	
Tree	Myrtle Ebony, Grey Persimmon, Black Myrtle, Grey Plum	Ebenaceae	*Diospyros pentamera*		Yes
Tree	Native Tamarind	Sapindaceae	*Diploglottis australis*		Yes
Tree	Sassafras	Atherospermataceae	*Doryphora sassafras*		
Tree	Koda, Silky Ash, Churnwood	Boraginaceae	*Ehretia acuminata* var. *acuminata*		Yes
Shrub	Red Olive Berry	Celastraceae	*Elaeodendron australe*	Yes	Yes
Tree	White-topped Box, Coast White Box	Myrtaceae	*Eucalyptus quadrangulata*		
Tree	Forest Red Gum, Buringoa (D'harawal)	Myrtaceae	*Eucalyptus tereticornis*		
Shrub	Bolwarra, Copper Laurel	Eupomatiaceae	*Eupomatia laurina*		
Other	Wombat Berry	Luzuriagaceae	*Eustrephus latifolius*	Yes	
Shrub; Tree	Figs	Moraceae	*Ficus spp.* (e.g. *Ficus coronata*, *Ficus macrophylla*, *Ficus obliqua*; but may include other *Ficus* species) **Note: If more than one *Ficus* spp. is present, each one counts towards the diversity threshold in the Condition Thesholds.**	Yes	Yes
Other	Scrambling Lily	Luzuriagaceae	*Geitonoplesium cymosum*	Yes	
Tree	Guioa	Sapindaceae	*Guioa semiglauca*		Yes
Forb	Settlers Twine/Flax, Boorgay	Araceae	*Gymnostachys anceps*	Yes	

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Other	Sweet Morinda	Rubiaceae	*Gynochthodes jasminoides*		
Shrub	Native Rosella	Malvaceae	*Hibiscus heterophyllus* subsp. *heterophyllus*		Yes
Fern	Trim Shield-fern, Trim Shield Fern	Dryopteridaceae	*Lastreopsis decomposita*		
Fern	Creeping Shield Fern	Dryopteridaceae	*Lastreopsis microsora* subsp. *microsora*		
Other	Round-leaf Vine	Menispermaceae	*Legnephora moorei*	Yes	Yes
Other	Cabbage Fan Palm, Cabbage Tree Palm, Daranggara (Cadigal), Cabbage Palm, Fan Palm	Arecaceae	*Livistona australis*		
Other	Cockspur Thorn	Moraceae	*Maclura cochinchinensis*		Yes
Other	Hairy Milk Vine	Apocynaceae	*Marsdenia flavescens*		
Other	Milk Vine	Apocynaceae	*Marsdenia rostrata*	Yes	
Shrub	Prickly-leaved Tea Tree	Myrtaceae	*Melaleuca styphelioides*		
Shrub	Hairy-leaved Doughwood, White Euodia	Rutaceae	*Melicope micrococca*		
Shrub	Tree Violet	Violaceae	*Melicytus dentatus*		
Fern	Fragrant Fern	Polypodiaceae	*Microsorum scandens*		
Shrub	Brush Muttonwood	Primulaceae	*Myrsine howittiana*		
Shrub		Primulaceae	*Myrsine variabilis*		
Shrub	Large Mock-olive, Large-leaved Olive	Oleaceae	*Notelaea venosa*	Yes	
Grass & grasslike	Australian Basket Grass, Wavy Beard Grass	Poaceae	*Oplismenus aemulus*	Yes	
Grass & grasslike	Creeping Beard Grass	Poaceae	*Oplismenus imbecillis*		
Other	Wonga Wonga Vine	Bignoniaceae	*Pandorea pandorana* subsp. *pandorana*	Yes	
Other	Common Silkpod, Monkey Rope	Apocynaceae	*Parsonsia straminea*		
Fern	Sickle Fern	Pteridaceae	*Pellaea falcata*	Yes	
Tree	Brown Beech	Pennantiaceae	*Pennantia cunninghamii*		Yes
Other	Giant Pepper Vine	Piperaceae	*Piper hederaceum* var. *hederaceum*		Yes
Shrub	Orange Thorn	Pittosporaceae	*Pittosporum multiflorum*	Yes	Yes

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Shrub	Wild Yellow Jasmine, Rough fruit Pittosporum	Pittosporaceae	*Pittosporum revolutum*		
Shrub	Native Daphne, Sweet Pittosporum, Snowdrop Tree (L.H.I.), Mock Orange	Pittosporaceae	*Pittosporum undulatum*	Yes	
Tree	Black Apple, Wild Plum, Yellow Buttonwood, Black Plum, Yellow Bulletwood	Sapotaceae	*Planchonella australis*		Yes
Forb	Cockspur Flower	Lamiaceae	*Plectranthus parviflorus*	Yes	
Grass & grasslike	Tussock	Poaceae	*Poa labillardierei* var. *labillardierei*		
Tree	Plum Pine, Brown Pine	Podocarpaceae	*Podocarpus elatus*		Yes
Forb	Pastel Flower	Acanthaceae	*Pseuderanthemum variabile*		
Fern	Jungle Brake	Pteridaceae	*Pteris umbrosa*		
Fern	Rock Felt Fern	Polypodiaceae	*Pyrrosia rupestris*		
Shrub	Scrub Turpentine, Brown Malletwood	Myrtaceae	*Rhodamnia rubescens*		
Shrub	Big Yellow Wood, Yellow Wood	Rutaceae	*Sarcomelicope simplicifolia* subsp. *simplicifolia*		
Other	Pearl Vine	Menispermaceae	*Sarcopetalum harveyanum*	Yes	
Tree	Flintwood, Mountain Cherry, Brown Birch, Scolopia	Salicaceae	*Scolopia braunii*		Yes
Other	Lawyer Vine, Wait-a-while, Barbwire Vine	Smilacaceae	*Smilax australis*	Yes	
Forb		Caryophyllaceae	*Stellaria flaccida*		
Shrub	Scrub Beefwood, Red Silky Oak	Proteaceae	*Stenocarpus salignus*		
Other	Snake Vine	Menispermaceae	*Stephania japonica*	Yes	
Tree	Whalebone Tree	Moraceae	*Streblus brunonianus*	Yes	Yes
Shrub	Brush Cherry	Myrtaceae	*Syzygium australe*	Yes	
Tree	Lilly Pilly, Midjuburi (Cadigal)	Myrtaceae	*Syzygium smithii* (syn. *Acmena smithii*)	Yes	
Tree	Red Cedar, Santhana Vembu	Meliaceae	*Toona ciliata*	Yes	Yes

Broad growth form category	Common name	Family Name	Scientific name	*Listed in NSW Milton–Ulladulla TEC	#Listed in NSW Illawarra TEC
Other	Burny Vine	Moraceae	*Trophis scandens*	Yes	Yes
Other	Bearded Tylophora	Apocynaceae	*Tylophora barbata*		
Forb	Stinging Nettle	Urticaceae	*Urtica incisa*		
Shrub	Veiny Wilkiea	Monimiaceae	*Wilkiea huegeliana*		Yes

* Milton–Ulladulla Subtropical Rainforest Final Determination (NSW Scientific Committee 2002b)

Listed in NSW Illawarra Subtropical Rainforest Final Determination (NSW Scientific Committee 2002a)

Table A2: Fauna of the Illawarra–Shoalhaven subtropical rainforest – Birds.

Common Name – Birds	Scientific Name
'Specialist' subtropical rainforest birds of the ecological community: Source: Illawarra Birders (analysis of bird survey data, unpublished 2019)	
Australian Brush Turkey	*Alectura lathami*
Bassian Thrush	*Zoothera lunulata*
Black-faced Monarch	*Monarcha melanopis*
Brown Cuckoo-dove	*Macropygia phasianella*
Cicadabird	*Coracina tenuirostris*
Green Catbird	*Ailuroedus crassirostris*
Logrunner	*Orthonyx temminckii*
Noisy Pitta	*Pitta versicolor*
Pacific Emerald-dove	*Chalcophaps longirostris*
Pilotbird	*Pycnoptilus floccosus*
Pink Robin	*Petroica rodinogaster*
Sooty Owl	*Tyto tenebricosa*
Superb Fruit-dove	*Ptilinopus superbus*
Superb Lyrebird	*Menura novaehollandiae*
Topknot Pigeon	*Lopholaimus antarcticus*
White-headed Pigeon	*Columba leucomela*
Wonga Pigeon	*Leucosarcia melanoleuca*
Yellow-throated Scrubwren	*Sericornis citreogularis*
Native birds of the ecological community: Source: Mills & Jakeman (1995); NSW NPWS (2002b); NSW DECCW (2011a); Illawarra Birders (analysis of bird survey data, unpublished 2019).	
Australasian Figbird	*Sphecotheres vieilloti*
Australian Brush Turkey	*Alectura lathami*
Australian King Parrot	*Alisteris scapulatis*
Australian Magpie	*Gymnorhina tibicen*
Australian Raven	*Corvus coronoides*
Barred Cuckoo-shrike	*Coracina lineata*
Bar-shouldered Dove	*Geopelia humeralis*

Common Name – Birds	Scientific Name
Bassian Thrush	*Zoothera lunulata*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Black-faced Monarch	*Monarcha melanopsis*
Brown Cuckoo-dove	*Macropygia amboinensis*
Brown Gerygone	*Gerygone mouki*
Brown Thornbill	*Acanthiza pusilla*
Brush Cuckoo	*Cacomantis variolosus*
Channel-billed Cuckoo	*Scythrops novaehollandiae*
Crested Shrike-tit	*Falcunculus frontatus*
Crimson Rosella	*Platycercus elegans*
Eastern Spinebill	*Acanthorhynchus tenuirostris*
Eastern Rosella	*Platycercus adscitus*
Eastern Whipbird	*Psophodes olivaceus*
Eastern Yellow Robin	*Eopsaltria australis*
Emerald Dove	*Chalcophaps indica*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Galah	*Eolophus roseicapilla*
Golden Whistler	*Pachycephala pectoralis*
Green Catbird	*Ailuroedus crassirostris*
Grey Butcherbird	*Cracticus torquatus*
Grey Fantail	*Rhipidura albiscapa*
Grey Goshawk	*Accipiter novaehollandiae*
Grey Shrikethrush	*Colluricincla harmonica*
Large-billed Scrubwren	*Sericornis magnirostra*
Lewin's Honeyeater	*Meliphaga lewinii*
Little Wattlebird	*Anthochaera chrysoptera*
Logrunner	*Orthonyx temminckii*
Long-tailed Cuckoo, Long-tailed Koel	*Urodynamis taitensis*
Masked Owl	*Tyto novaehollandiae*
Mistletoe Bird	*Dicaeum hirundinaceum*

Common Name – Birds	Scientific Name
Noisy Friarbird	*Philemon corniculatus*
Noisy Pitta	*Pitta versicolor*
Olive-backed Oriole	*Oriolus sagittatus*
Olive Whistler	*Pachycephala olivacea*
Pale-yellow Robin	*Tregellasia capito*
Pied Currawong	*Strepera graculina*
Pink Robin	*Petroica rodinogaster*
Pilotbird	*Pycnoptilus floccosus*
Powerful Owl	*Ninox strenua*
Rainbow Lorikeet	*Trichoglossus haematodus*
Red-browed Treecreeper	*Climacteris erythrops*
Red-browed Finch, Red-browed Firetail	*Neochmia temporalis*
Regent Bowerbird	*Sericulus chrysocephalus*
Rose Robin	*Petroica rosea*
Rose-crowned Fruit-dove	*Ptilinopus regina*
Rufous Fantail	*Rhipidura rufifrons*
Satin Bowerbird	*Ptilonorhynchus violaceus*
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*
Shining Bronze-cuckoo	*Chalcites lucidus*
Silvereye	*Zosterops lateralis*
Sooty Owl	*Tyto tenebricosa*
Southern Boobook	*Ninox novaeseelandiae*
Spotted Pardalote	*Pardalotus punctatus*
Spangled Drongo	*Dicrurus bracteatus*
Spectacled Monarch	*Symposiachrus trivirgatus*
Sulphur-crested Cockatoo	*Cacuata galerita*
Superb Fruit-dove	*Ptilinopus superbus*
Superb Lyrebird	*Menura novaehollandiae*
Tawny Frogmouth	*Podargus strigoides*
Topknot Pigeon	*Lopholaimus antarcticus*

Common Name – Birds	Scientific Name
White-browed Scrubwren	*Sericornis frontalis*
White-headed Pigeon	*Columba leucomela*
White-naped Honeyeater	*Melithreptus lunatus*
White-throated Treecreeper	*Cormobates leucophaea*
Wompoo Fruit-dove	*Ptilinopus magnificus*
Wonga Pigeon	*Leucosarcia melanoleuca*
Yellow-faced Honeyeater	*Caligavis chrysops*
Yellow-tailed Black-cockatoo	*Calyptorhyncus funereus*
Yellow-throated Scrubwren	*Sericornis citreogularis*

Table A3: Fauna of the Illawarra–Shoalhaven subtropical rainforest – Mammals.

Common Name – Mammals	Scientific name
Brown Antechinus	*Antechinus stuartii*
Bush Rat	*Rattus fuscipes*
Chocolate-wattled Bat	*Chalinolobus morio*
Common Brushtail Possum	*Trichosurus vulpecula*
Common Ringtail Possum	*Pseudocheirus peregrinus*
Common Wombat, Bare-nosed Wombat	*Vombatus ursinus*
Dusky Antechinus	*Antechinus swainsonii*
Eastern Bentwing-bat	*Miniopterus orianae oceanensis*
Eastern Horseshoe bat	*Rhinolophus megaphyllus*
Eastern Pygmy-possum	*Cercartetus nanus*
Eastern Quoll[31]	*Dasyurus viverrinus**
Fawn-footed Melomys	*Melomys cervinipes*
Feathertail Glider	*Acrobates pygmaeus*
Golden-tipped Bat	*Phoniscus papuensis*
Gould's Longeared Bat	*Nyctophilus gouldi*
Gould's Wattled Bat	*Chalinolobus gouldii*
Grey-headed Flying-fox	*Pteropus poliocephalus*
Large-eared Pied Bat	*Chalinolobus dwyeri*
Large-footed Myotis	*Myotis macropus*
Lesser Longeared Bat	*Nyctophilus geoffroyi*

[31] No verified sightings of live animals have occurred in NSW since 1963 (NSW Office of Environment and Heritage, Threatened Species Profile, 18 January 2019).

ATTACHMENT B
FLORA PLOTS

Dido St Kiama, Plot R3			**Covers**	**Native**	Trees	Shrubs	Grass	Forb	Fern	Other	**Exotic**	HighThreat
Sheet version: 20170224.1531			**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
			34	**26**	5	6	4	2	4	5	**8**	5
Species	**Diagnostic species**	**Cover**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			35.3	**33.7**	16.7	14.7	0.5	0.3	0.9	0.6	**1.6**	1.3
Pellaea falcata	yes	0.5	EG						0.5			
Doodia aspera		0.2	EG						0.2			
Lantana camara		0.2	HT									0.2
Pseuderanthemum variabile	yes	0.2	FG					0.2				
Sticherus flabellatus		0.1	EG						0.1			
Lindsaea linearis		0.1	EG						0.1			
Parsonsia straminea	yes	0.1	OG							0.1		
Glochidion ferdinandi		3	TG		3							
Acacia melanoxylon	yes	3	TG		3							
Maclura cochinchinensis	yes	0.1	OG							0.1		
Notelaea venosa	yes	8	SG			8						
Pittosporum undulatum	yes		SG			0						
Persicaria hydropiper		0.1	FG					0.1				
Asparagus aethiopicus		0.5	HT									0.5
Cyperus spp.		0.1	GG				0.1					
Eustrephus latifolius	yes	0.1	OG							0.1		
Geitonoplesium cymosum	yes	0.1	OG							0.1		
Ochna serrulata		0.1	HT									0.1
Microlaena stipoides		0.1	GG				0.1					
Oplismenus imbecillis	yes	0.2	GG				0.2					
Conyza bonariensis		0.1	EX								0.1	
Bidens pilosa		0.1	EX								0.1	
Ageratina adenophora		0.4	HT									0.4
Solanum nigrum		0.1	EX								0.1	
Calochlaena dubia		0.2	OG							0.2		
Acetosella vulgaris		0.1	HT									0.1
Juncus spp.		0.1	GG				0.1					
Podocarpus elatus		0.5	TG		0.5							
Pittosporum multiflorum	yes	0.5	SG			0.5						
Alchornea ilicifolia		0.2	SG			0.2						
Streblus brunonianus	yes	10	TG		10							
Commersonia fraseri		2	SG			2						
Ficus macrophylla	yes	0.2	TG		0.2							
Alectryon subcinereus	yes	4	SG			4						
	14											

Dido St Kiama, Plot R6			Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
			# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
			30	21	2	7	3	3	2	4	9	6
Dido St Kiama, Plot R6			Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
Species	Cover	Diagnostic species	75	79.5	16	36.2	12.2	6	5	4.1	22.5	18.5
Alchornea ilicifolia	0.2		SG			0.2						
Asparagus aethiopicus	5		HT									5
Commersonia fraseri	2		SG			2						
Conyza bonariensis	2		EX								2	
Doodia aspera	3		EG						3			
Eustrephus latifolius	0.1	yes	OG							0.1		
Glochidion ferdinandi	3		TG		15							
Lantana camara	3		HT									3
Notelaea venosa	10	yes	SG			10						
Ochna serrulata	0.5		HT									0.5
Oplismenus imbecillis	0.2	yes	GG				0.2					
Parsonsia straminea	0.5	yes	OG							0.5		
Pellaea falcata	2	yes	EG						2			
Pittosporum multiflorum	0.5	yes	SG			0.5						
Pittosporum undulatum	5	yes	SG			20						
Pseuderanthemum variabile	2	yes	FG					2				
Streblus brunonianus	1	yes	TG		1							
Rubus spp.	3		SG			3						
Lantana montevidensis	1		EX								1	
Ehrharta erecta	2		HT									2
Plantago lanceolata	1		EX								1	
Hibbertia scandens	3		OG							3		
Carex longebrachiata	10	yes	GG				10					
Poa labillardierei	2	yes	GG				2					
Commelina cyanea	3	yes	FG					3				
Cinnamomum camphora	3		HT									3
Smilax glyciphylla	0.5	yes	OG							0.5		
Breynia oblongifolia	0.5	yes	SG			0.5						
Gymnostachys anceps	1	yes	FG					1				
Olea europaea	5		HT									5
		15										

Dido St Kiama, Plot R7			Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
			# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
			26	18	2	4	1	2	4	5	8	6
Species	Cover	Diagnostic species	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
			110	72.9	20	15.7	5	5	16	11.2	37.1	35
Acacia maidenii	10	yes	TG		10							
Ageratina adenophora	2		HT									2
Alchornea ilicifolia	0.2		SG			0.2						
Asparagus aethiopicus	4		HT									4
Bidens pilosa	0.1		EX								0.1	
Carex longebrachiata	4	yes	OG							4		
Conyza bonariensis	2		EX								2	
Dichondra repens	3		FG					3				
Doodia aspera	10		EG						10			
Eustrephus latifolius	3	yes	OG							3		
Geitonoplesium cymosum	0.1	yes	OG							0.1		
Lantana camara	3		HT									3
Lindsaea linearis	1		EG						1			
Maclura cochinchinensis	0.1	yes	OG							0.1		
Notelaea venosa	5	yes	SG			5						
Ochna serrulata	1		HT									1
Olea europaea	15		HT									15
Oplismenus imbecillis	5	yes	GG				5					
Pellaea falcata	3	yes	EG						3			
Pittosporum multiflorum	0.5	yes	SG			0.5						
Pittosporum undulatum	10	yes	SG			10						
Ehrharta erecta	10		HT									10
Pseuderanthemum variabile	2	yes	FG					2				
Smilax australis	4	yes	OG							4		
Sticherus flabellatus	2		EG						2			
Streblus brunonianus	10	yes	TG		10							
		13										