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ECOLOGICAL ASSESSMENT

For the

Proposed Rezoning

at

10 HILLSIDE ROAD, AVOCA BEACH, NSW
(LOT 365 IN DP 654892)

AUGUST 2014

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APPENDICES

DOCUMENT TRACKING

Project Location	10 Hillside Road, Avoca Beach
Date	29/08/14
Prepared by	Kristan Dowdle
Reviewed by	Anthony Clarke
Approved by	Kristan Dowdle
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Version	3

1.0 INTRODUCTION

Clarke Dowdle & Associates was engaged to conduct a Flora and Fauna Assessment on the site located at 10 Hillside Road, Avoca Beach. Ecological investigations over the site have been undertaken for the proposed rezoning of the land.

This report aims to recognise the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Threatened Species Conservation Act 1995* (TSC Act). Assessment of the site under the requirements of State Environmental Planning Policy No. 44 (SEPP 44) – 'Koala Habitat Protection' is also included. State and local government policies and guidelines formed the basis of project surveying methodology including the Department of Environment and Climate Change's (DECC) Threatened Species Survey and Assessment Guidelines; and Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft 2004).

1.1 Licenses and Approvals

This flora and fauna survey was conducted under:

- National Parks and Wildlife Service Scientific Investigation Number S11333
- Animal Research Authority issued by the Director-General of NSW Agriculture
- Approval of the Animal Care and Ethics Committee of the Director-General of NSW Agriculture

2.0 SITE DESCRIPTION

2.1 Site Location

The subject site is known as 10 Hillside Road, Avoca Beach (Lot 365 in DP 654892). The allotment has a total area of approximately 2.2 hectares. The site is in the Local Government Area (LGA) of Gosford City Council. Approximate MGA coordinates of the centre of the allotment are 353130E and 6295785N.

Figure 1: Aerial Photograph of Site (bordered in red)
Source: Nearmap, 2014

The majority of the site has been zoned as E4-Environmental Management, whilst the rear south western portions area zoned as 7(a)-Conservation under the deferred Gosford Local and Environmental Plan, 2014 (See Figure 2).

Figure 2: Zoning Mapping (site bordered in Blue)
Source: Gosford LEP 2014

2.2 Site Condition

The site contains an existing dwelling on the northern portions of the allotment which is surrounded by cleared lands that extend across the majority of the site. The site also contains partially constructed dirt driveways associated with a previously approved development application. The southern and south-western portions contain a remnant forest community, however, the majority of these areas do not have an understorey with cleared lands and exotic species growing.

2.3 Proposed Development

The proposed development intends to amend the Land Zoning Map to Gosford Local Environmental Plan 2014 to rezone Lot 365 in DP 654892, No. 10 Hillside Road, Avoca Beach from Part E4 Environmental Living and Part 7A to E3 Environmental Management and to have the minimum lot size map amended from 2ha to 1ha so as to permit a two lot rural - residential subdivision of the site.

3.0 OBJECTIVES AND SCOPE OF THE ASSESSMENT

The scope of this flora, fauna and ecological constraints assessment report is to:

- Undertake a site appraisal to investigate the likelihood of any threatened species, communities or populations to be present or utilise the site;
- Identify dominant vascular plant species found on the site should native vegetation communities exist;
- Assess the status of identified plant species and vegetation communities under relevant legislation if required;
- Identify existing habitat types on the site and assess the habitat potential for threatened species, populations, or ecological communities known from the proximate area;
- Through preliminary research identify threatened fauna potentially using the site;
- Identify the biodiversity values and constraints on the site;
- Assess the potential impacts of the proposed rezoning on threatened species, populations or ecological communities, or their habitats; and to
- Provide recommendations to ensure that the recorded biodiversity values on the site are adequately managed and/or protected.
- achieve these objectives, the following information sources were reviewed;

Whilst survey work was undertaken wholly within the bounds of the site, consideration has been afforded to areas off the site in order to appreciate the environmental context of the site.

The purpose of this report is to:

- ensure planning, management and development decisions are based on sound scientific information and advice by documenting the presence of any biodiversity components or potential significant impacts that may exist on the site;
- provide information to enable compliance with applicable assessment requirements contained within the EPA Act, TSC Act, and any other relevant state, regional and local environmental planning instruments; and
- enable the provision and analysis of ecological data that is comparable with data for other sites within the region to ensure continuity and consistency for survey and results.

4.0 METHODS

4.1 Desktop Review

To assist in identifying distributions, suitable habitats and known records of threatened species so that field investigations could more efficiently focus on the survey effort, the following sources of information were reviewed prior to commencement of field surveys;

- Aerial Photograph Interpretation (API) to determine the broad categorisation of vegetation within the site;
- Review of fauna and flora records contained in the Atlas of NSW Wildlife (Office of Environment and Heritage (OEH);
- Department of Sustainability, Environment, Water, Populations and Communities (SEWPAC) *EPBC Act 1999* Protected Matters Search
- Review of the Natural vegetation of the Gosford Local Government Area, Central Coast, NSW (Bell, 2008);
- Review of the Department of Conservation and Land Management – Soil Landscapes of the Gosford – Lake Macquarie 1:100,000 Sheet (Murphy C.L., 1993); and
- OEH database of Threatened Species, Populations and Ecological Communities (website);

4.2 Flora Survey

4.2.1 Field Survey

To identify the extent and the composition of the flora diversity at the subject site random meander searches were carried out over the entire site on the 8th of August 2014.

All floras were surveyed in accordance with *LHHCREMS Survey Guidelines.*

Floristic identification and nomenclature was based on Harden (1992, 1993, 2000, and 2002) with subsequent revisions as published on Plant Net. Plants and vegetation deemed to be of local conservation significance were also considered in this assessment.

All vascular plant species observed are listed in **Appendix B**.

4.2.2 Limitations

The timing and season of the survey is outside the known flowering periods of some threatened species and therefore these species may have not been detected.

In order to overcome some survey limitations, this report includes a detailed assessment of the habitat present upon the site. This habitat analysis is then compared to the results of database searches for threatened species occurring within a 10 kilometre radius of the site. This comparison allows for the prediction of potential use of the site by species of conservation significance. This process ensures that all threatened species with potential to use the site are considered in the impact assessment, rather than only those that were recorded during the survey.

4.3 Fauna Survey

A detailed and targeted traverse over the site and adjoining areas was conducted for the presence and/or signs of any rare or endangered fauna species on the 8th of August, 2014. The survey provided for a habitat assessment and involved the following sequence of works;

- Searching for targeted threatened species
- Habitat identification
- Searches amongst ground litter and rocks (reptiles and amphibians)
- Scat Identification
- Identification through visual encounters and vocal recognition
- Searches for tree and limb hollows
- Searches for scratches, nests, diggings, white wash, bones and other traces of fauna

During the survey, attention was given to habitat found throughout the study area. A diverse range of habitats which include overstorey, understorey and groundcover vegetation, rock outcrops, large rocks, dense and open vegetation, feed trees, fallen timber, leaf and bark litter etc are all important habitat components for a wide range of flora and fauna. Note was taken of the habitat types and any valuable or sensitive habitat found within the study area that may be impacted by the proposed development. Observations were also made as to whether the site forms a corridor or is part of a corridor or part of a chain of remnant islands of vegetation and whether the proposed development is likely to enhance or compromise that corridor

4.3.1 Limitations

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5.0 FLORA RESULTS

5.1 Desktop Assessment

5.1.1 Vegetation Mapping

Natural vegetation of the Gosford LGA, Central Coast, NSW (Bell, 2008) and maps two native vegetation communities; *Coastal Narrabeen Ironbark Forest (Map Unit 6b), Coastal Narrabeen Moist Forest (Map unit 6ai);* and one disturbed community being, *Disturbed - Canopy Only* (*Map Unit Xr*) Figure 3 highlights the result of the Bell (2008) mapping.

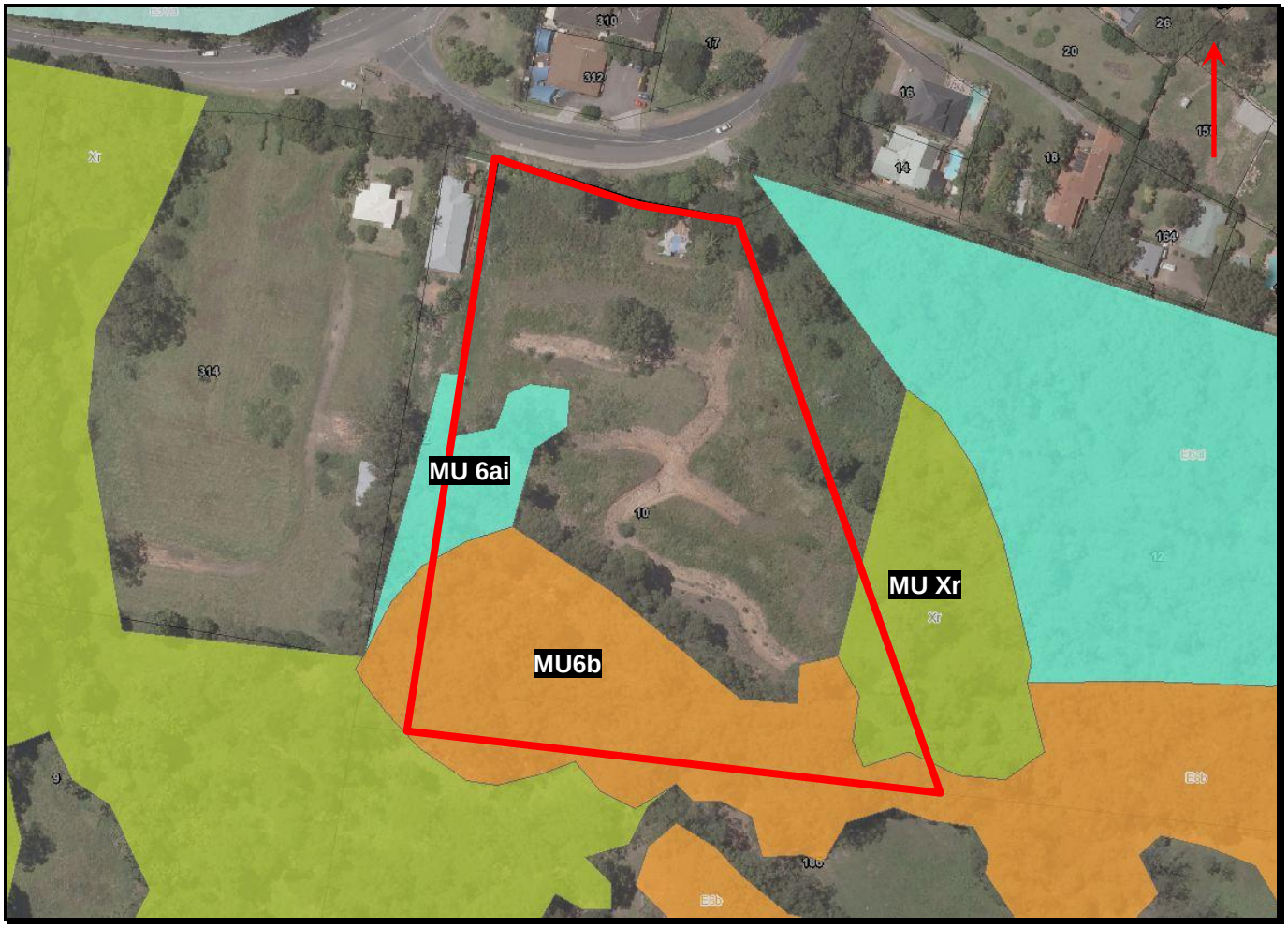

Figure 3: Vegetation Mapping of the Subject Site
Source: Gosford City Council (Bell, 2008)

It is noted that the cleared northern portions of the allotment have not been mapped as containing a vegetation community. None of the vegetation communities mapped as deemed as being an Endangered Ecological Community.

5.1.2 Threatened Flora

The results of a desktop search indicated that 11 threatened flora species have been previously recorded within 10km of the site (the locality). The results of this search along with the likelihood of occurrence based upon the potential habitat within the site are detailed in Table 1.

Table 1 – Atlas of NSW Wildlife Flora Species Results

Scientific & Common Name	NSW status	Comm. status	Species Information	Comments
Senecio spathulatus Coast Groundsel	E1,P		A low growing daisy that prefers primary dunes. Known to occur at Cape Howe and between Kurnell north to Myall Lakes National Park. Also occurs in coastal locations in eastern Victoria.	No suitable habitat on site & not likely to occur.
Wilsonia backhousei Narrow-leafed Wilsonia	V,P		Is a perennial, sprawling, matted shrub less than 15 cm tall. This is a species of the margins of salt marshes and lakes	No suitable habitat on site & not likely to occur.
Tetratheca juncea Black-eyed Susan	V,P	V	A small shrub that grows in sandy, sometimes swampy heath, and also dry sclerophyll forest mainly along the lower end of the region around Bulahdelah.	Suitable habitat present but not observed on site.
Epacris purpurascens var. purpurascens	V,P		Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence	No suitable habitat on site & not likely to occur.
Chamaesyce psammogeton Sand Spurge	E1,P		Prostrate herb. Coastal dunes. Distribution limits N Tweed Heads S-Jervis Bay	No suitable habitat on site & not likely to occur
Pultenaea maritima Coast Headland Pea	V,P		A prostrate, mat forming shrub with hairy stems. Recorded from Newcastle north to Byron Bay on 16 headlands. Occurs in grasslands, shrublands and heath on exposed coastal headlands	No suitable habitat on site & not likely to occur.
Acacia pubescens Downy Wattle	V,P	V	A prostrate shrub that grows in heath on sandy soils. Two recorded populations of the species exist; these occur at Bumble Hill and Strickland State Forest	No suitable habitat on site & not likely to occur
Prostanthera askania Tranquility Mintbush	E1,P	E	*Prostanthera askania* is restricted to the Ourimbah-Narara area near Gosford on the Central Coast of NSW, where it is known to exist in only 5 populations. It grows in sclerophyll forests on ridges adjacent to rainforest.	No suitable habitat on site & not likely to occur
Eucalyptus camfieldii Camfield's Stringybark	V,P	V	A small tree to 8m high or a mallee to 2m in poorly drained sites. The species is restricted to a few stands on shallow-soiled sandstone or lateritic tops bordering coastal heath.	No suitable habitat on site & not likely to occur
Melaleuca biconvexa Biconvex Paperbark	V,P	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	No suitable habitat on site & not likely to occur.
Syzygium paniculatum Magenta Lilly Pilly	E1,P	V	A shrub to small tree found in sub-tropical and littoral rainforest on sandy soils or sheltered gullies mostly near water courses. Distribution between Bulahdelah and Jervis Bay.	Suitable habitat present but not observed on site.

Notes for Tables 1:
P- Protected, P 13-Protected Native Plants, V-Vulnerable, E1-Endangered, E2-Endangered Population, E4-Extinct, E4A -Critically Endangered Species

As can be seen the site did not contain any of the species listed. The site did however contain marginal habitat for some the species however these were not observed in the site survey.

5.1.2 Endangered Ecological Communities.

The results of a desktop search indicated that 16 Endangered Ecological Communities (EEC) that have been previously recorded within 10km of the site (the locality). The results of these searches are detailed in Table 2

Table 2 – Atlas of NSW Wildlife EEC Results

Name	NSW status	Comm. status	Comments
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	V	Not recorded on site
Coastal Upland Swamp in the Sydney Basin Bioregion	E3		No recorded on site
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Not recorded on site
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	E3		Not recorded on site
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	E4B		Not recorded on site
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	Not recorded on site
Low woodland with heathland on indurated sand at Norah Head	E3		Not recorded on site
Lower Hunter Spotted Gum-Ironbark Forest in the Sydney Basin Bioregion	E3		Not recorded on site
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E3	CE	Not recorded on site
Quorrobolong Scribbly Gum Woodland in the Sydney Basin Bioregion	E3		Not recorded on site
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Not recorded on site
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Not recorded on site
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Not recorded on site
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E3		Not recorded on site
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3		Not recorded on site
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	E3		Not recorded on site

Notes for Tables 2:
P- Protected, P 13-Protected Native Plants, V-Vulnerable, E1-Endangered, E2-Endangered Population, E4-Extinct, E4A -Critically Endangered Species

As can be seen the site did not contain any of the communities listed.

5.2 Vegetation Communities Present

Generally the vegetation in the study area is related to previous site disturbance, geology and soils. The following description is provided for the vegetation community within the subject site (See Figure 4 for location and distribution of vegetation).

BLACKBUTT/BLUE GUM/STRINGY BARK FOREST

Structure: Trees between 15 to 25 metres high with a canopy cover between 25-40 percent. Sparse lower layer dominate by predominately weed species with coverage of <15%.

Trees: *Eucalyptus pilularis, Eucalyptus saligna*, *Eucalyptus acmenodies* and *Syncarpia glomulifera*

Smaller Trees: *Glochidion ferdinandii*, *Allocasuarina littoralis, Acacia maidenii, Rhodamnia rubescens, Pittosporum undulatum* and *Persoonia levis*

Groundlayer: *Imperata cylindrica, Blechnum cartilagineum & Dianella caerulea*.

Distribution This vegetation community occupies a narrow strip running along the northern boundary of the site.

Variation: Majority of the area has the understorey no existing with a weeds (Lantana) growing amongst this area.

Disturbance & Weed Invasion This community has weed infestations, including Lantana *Lantana camara*, Blackberry *Rubus spp., Protasparagus aethiopicus*, Asparagus Fern, Crofton Weed *Ageratina agenophora* and *Solanum mauritianum*, Wild Tabacco

Relationship: Equivalent to a representation of *Coastal Narrabeen Ironbark Forest.* (Bell, 2008)

Total Area: Approximately 7900m^2

DISTURED PADDOCK/GRASSLANDS

Structure: Trees between 15 to 25 metres high with a canopy cover between less than 5 percent

Trees: *Eucalyptus saligna*, *Cinnamomum camphora* and *Glochidion ferdinandii, Acacia longifolia*

Shrubs: *Arundo donax, Lingustrum sinense*, *Solanum mauritianum*

Groundlayer: *Andropogon virginicus, Pennisetum clandestinum, Imperata cylindrica and Pteridium esculentum*

Distribution Covers the majority of the site.

Variation: There is variation surrounding the existing dwelling with ornamental plants and gardens existings

Disturbance & Weed Invasion This community has weed infestations, including *Arundo donax, Lantana camara*, *Rubus spp., Protasparagus aethiopicus*, *Ageratina agenophora* and *Solanum mauritianum*,

Relationship: No relationship

Total Area: Approximately 12625m^2

5.3 Flora Survey Results

The flora survey identified a total of seventy nine (79) species on the subject site including fifty-two (52) endemic species and twenty-seven (27) exotic species. A summary of the species identified is found in **Appendix B**

5.4 Threatened Species

No listed threatened species were identified on the site.

5.5 Endangered Ecological Communities

No endangered ecological communities were identified within or within close proximity of the site.

Figure 4: Vegetation Communities

6.0 FAUNA HABITAT OF THE SUBJECT SITE

6.1 Desktop Assessment

6.1.1 Threatened Fauna

The results of a desktop search (OEH, 2014 & DEWHA) indicated that 42 threatened fauna species have been previously recorded within 10km of the site. The results of this search along with the likelihood of occurrence based upon the potential habitat within the site are detailed in Table 3. All pelagic and marine species found in the database search have been omitted from the table and from further assessment.

Table 3 – Atlas of NSW Wildlife Threatened Fauna Species Results

Scientific Name	Habitat Requirements	NSW status	Comm. status	Potential Habitat Present
Pseudophryne australis Red-crowned Toadlet	Seems to be restricted to the Hawkesbury Sandstone ridges and may be found beside temporary creeks, gutters and soaks within this area and under logs and rocks	V,P		No
Litoria aurea Green and Golden Bell Frog	This frog species inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins.	E1,P	V	No
Litoria brevipalmata Green-thighed Frog	Occurs in a range of habitats in areas where surface water gathers after rains. From rainforests and moist Eucalypt forest to dry Eucalypt forests and heath	V,P		No
Varanus rosenbergi Rosenberg's Goanna	Preferred habitat for the species includes coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	V,P		No
Hoplocephalus stephensii Stephens' Banded Snake	Inhabits rainforest, wet sclerophyll forest, dry sclerophyll forest and rock outcrops along the coastal ranges from Gosford (N.S.W.) north to south-eastern Queensland.	V,P		No
Phaethon rubricauda Red-tailed Tropicbird	Breeds in coastal cliffs and under bushes in tropical Australia. Nests on cliffs of the northern hills and southern mountains on the main island at Lord Howe Island.	V,P		No
Ptilinopus magnificus Wompoo Fruit-Dove	Sub-tropical, littoral, warm temperate and dry rainforest, and wet sclerophyll with rainforest understorey. Preference for large areas of undisturbed forest.	V,P		No
Ptilinopus superbus Superb Fruit-Dove	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms.	V,P		No
Ixobrychus flavicollis Black Bittern	Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation. In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves	V,P		No
Hieraaetus morphnoides Little Eagle	Occupies open eucalypt forest, woodland or open woodland. She oak or acacia woodlands and riparian woodlands of interior NSW are also used	V,P		Yes
Lophoictinia isura Square-tailed Kite	Open forests and woodlands in coastal and subcoastal areas. Forages low over, or in, canopy for eggs, nestlings, passerines, small vertebrates and invertebrates	V,P,3		Yes
Pandion cristatus Eastern Osprey	This species is found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs.	V,P,3		No
Burhinus grallarius Bush Stone-curlew	Nocturnal, sedentary and territorial (when breeding) species generally roosting in open grassy woodlands with few or no shrubs, but with abundant leaf litter and fallen tree debris (i.e. >10% cover) which is key roosting habitat	E1,P		No
Callocephalon fimbriatum ' Gang-gang Cockatoo	Found in the summer months in tall mountain forests and woodlands, and mature wet sclerophyll forests	V,P,3		Yes
Calyptorhynchus lathami Glossy Black-Cockatoo	Inhabits forests, woodlands and timbered watercourse and feeds exclusively on the fruit of *Allocasuarina spp.*	V,P,2		Yes
Glossopsitta pusilla	Commonly found in dry, open eucalypt forests and	V,P		Yes

Little Lorikeet	woodlands. Can be found in roadside vegetation to woodland remnants. *G. pusilla* feeds on abundant flowering Eucalypts			
Lathamus discolor Swift Parrot	Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. alben*	E1,P,3	E	Yes
Ninox connivens Barking Owl	May be found in forests and woodlands and is most common in savanna woodland. Nests in open tree trunks or spouts 3 – 30 metres above the ground.	V,P,3		Yes
Ninox strenua Powerful Owl	This species occupies an extensive home range of up to 1000 hectares. Habitat preferences include mountain forests; gullies and forest margins; sparser hilly woodlands; coastal forests, woodlands, scrubs; and large trees.	V,P,3		Yes
Tyto novaehollandiae Masked Owl	Preferred habitat consists of forests, woodlands and farmlands with large trees and adjacent cleared country. Also found in timbered watercourses, paperback woodlands and cave. Nests in hollow eucalypts or in caves	V,P,3		Yes
Tyto tenebricosa Sooty Owl	Usually found in deep, moist gullies in rainforests and tall open forests although it occasionally forages in adjacent drier forests to hunt. Nests in hollow trunks of eucalypts over 30 metres high.	V,P,3		Yes
Chthonicola sagittata Speckled Warbler	Inhabits mostly inland woodlands (some drier coastal areas) with grassy understorey often on ridges and gullies. Remnants <100ha not suitable.	V,P		Yes
Anthochaera phrygia Regent Honeyeater	Inhabits temperate eucalypt woodlands and open forest, including forest edges, woodland remnants on farmland and urban areas. Also uses *Casuarina cunninghamiana* gallery forests.	E4A,P	E	No
Daphoenositta chrysoptera Varied Sittella	The species is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	V,P		Yes
Petroica boodang Scarlet Robin	The species breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat	V,P		Yes
Dasyurus maculatus Spotted-tailed Quoll	Inhabits rainforest, open forest, woodland, coastal heathland and inland riparian forest. Occurs to the snowline and inland to the western plains. Den sites have been recorded in caves, rock crevices and hollow logs.	V,P	E	No
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern)	Within New South Wales the species is rare and almost exclusively restricted to the coastal fringe of the State, from the southern side of the Hawkesbury River in the north, to the Victorian border in the south. Occurs in a variety of habitats in south-eastern Australia, including heathland, shrubland, dry sclerophyll forest with heathy understorey, sedgeland and woodland	E1,P	E	No
Phascolarctos cinereus Koala	Habitat consists of eucalypt forest and woodlands containing particular species including Red Gum, Grey Gum, Manna Gum, Tallowwood and Swamp Mahogany. Feed Tree Species are listed in Schedule 2 of SEPP 44 Koala Habitat Protection.	V,P	V	Yes
Cercartetus nanus Eastern Pygmy-possum	Inhabits a range of habitats including rainforests through sclerophyll forests to tress heat. It forages on banksias and myrtaceous shrubs such as bottlebrushes and tress mainly for pollen but also for a variety of insects.	V,P		No
Petaurus australis Yellow-bellied Glider	This species is the largest of all possums and prefers tall mature forests in regions of high rainfall. The species roosts in a den in a hollow branch, usually in a living smoothed bark eucalypt. Up to 24 species of eucalypt are used as feed trees.	V,P		Yes

Petaurus norfolcensis Squirrel Glider	Inhabits mixed aged stands of eucalypt forest & woodlands including gum barked and high nectar producing species with hollow bearing trees. The species has a home range of 20 to 30 hectares and is a hollow dependent species.	V,P		Yes
Potorous tridactylus Long-nosed Potoroo	Prefers cool rainforest, wet sclerophyll forest and heathland. Sleeps by day in a nest on the ground, and digs for succulent roots, tubers, fungi and subterranean insects.	V,P	V	No
Macropus parma Parma Wallaby	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	V,P		Yes
Pteropus poliocephalus Grey-headed Flying-fox	Roost sites (camps) are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy cover. The species feeds on a wide variety of flowering and fruiting, plants, including blossoms of eucalypts, banksias, figs and palms.	V,P	V	Yes
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	The species is a wide-ranging species found across northern and eastern Australia. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows	V,P		Yes
Mormopterus norfolkensis Eastern Freetail-bat	Habitat requirements are unclear, with most records from dry eucalypt forest and woodland east of the Great Dividing Range. The species has also been recorded flying over a rocky river through a rainforest and wet sclerophyll forest. The species is predominantly tree roosting however it has been recorded roosting in a roof with other bat species.	V,P		Yes
Chalinolobus dwyeri Large-eared Pied Bat	This species is mainly found in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands	V,P	V	Yes
Falsistrellus tasmaniensis Eastern False Pipistrelle	This species is found in a variety of forest types such as open forests, woodlands and wetter sclerophyll forests (usually with trees >20m). This species roosts in tree hollows.	V,P		Yes
Miniopterus australis Little Bentwing-bat	Prefers to forage in well-vegetated areas, such as within wet and dry sclerophyll forests and rainforests. Requires caves or similar structures for roosting habitat. Largely confined to more coastal areas.	V,P		Yes
Miniopterus schreibersii oceanensis Eastern Bentwing-bat	Inhabits wet and dry sclerophyll forests and rainforests. This species generally hunts above the forest canopy, and roots in caves, mine tunnels and buildings	V,P		Yes
Myotis macropus Southern Myotis	The species has been found roosting in caves, tunnels, tree hollows and possibly dense vegetation. Roosts have been located in trees up to 400m from the water typically forages over waterbodies and along streams, catching aquatic and flying insects	V,P		Yes
Scoteanax rueppellii Greater Broad-nosed Bat	Tree-hollow roosting species which inhabits the gullies and river systems draining the Great Dividing Range, extending to the coast over much of its range. Habitats range from woodland through to moist and dry eucalypt forest to rainforest.	V,P		Yes
Pseudomys gracilicaudatus Eastern Chestnut Mouse	The species is more often found in heathland and is most common in dense wet heath and swampy area. Optimal habitat is provided by young regenerating heath habitat after fire	V,P		No
Pseudomys novaehollandiae New Holland Mouse	The New Holland Mouse is a small native rodent similar in size and appearance to the introduced House Mouse Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	P	V	No

Notes for Tables 3:
P- Protected, P 13-Protected Native Plants, V-Vulnerable, E1-Endangered, E2-Endangered Population, E4-Extinct, E4A -Critically Endangered Species

6.2 Habitat Assessment

The cleared and disturbed areas of the site do not contain habitat features suitable for any threatened fauna species. The exotic grass and remnant trees are seen as sub-optimal habitat.

The southern and south-western portions of the site containing the remnant vegetation do have, in parts, a dense foliage cover. The canopy foliage that is present could provide foraging habitat for birds (including cockatoos, large woodland birds and small passerine birds) and shelter for arboreal mammals (including Ringtail and Brush-tail possums).

The site does not contain a well formed mid stratum and groundcover, due to previous land clearing and weed invasion, but areas of a deep leaf litter do exist. The site is therefore seen to provide sub-optimal habitat and shelter resources for terrestrial mammals, amphibians and reptiles.

A small amount of wood debris which provides habitat for small mammals, invertebrates, amphibians and reptiles does occur. However, due to only the small areas of this habitat and the surrounding cleared areas making these species easily observed by prey species, the habitat present is seen as sub-optimal.

The vegetated southern portions of the site are deemed to be a potential faunal corridor for fauna movement from the vegetated areas to the west of the site, through the site, to the adjoining vegetated areas to the east. The vegetation occurring to the east is contained within a gully and contains important winter flowering species (e.g. *Eucalyptus robusta*). Fauna species may utilise the habitat corridor to travel through to these areas to forage for food in the winter months and therefore this corridor should be retained. Figure 5 highlights the potential corridor.

Figure 5: Potential Fauna Movements

The site did contained two hollow bearing trees. These trees appeared to contain hollows suitable in size for small bird, small mammals and microbat species. They were not deemed sufficient in size for larger birds, mammals and owl species. The location of the hollows are highlighted in figure 6.

Figure 5: Hollow bearing Tree Locations

7.0 IMPACT ASSESSMENT

7.1 Description of Potential Impacts

The proposal is for the rezoning of the existing parcel of land to create rural/residential allotments. Due to the previously disturbed nature of the site, the lack of vegetation removal that will be required and the creation of a restriction on the southern portions of the site so that vegetation can be retained, the impacts associated with the propose rezoning as seen as negligible.

7.2 Threatened Species Assessment of Significance

No threatened species, communities or populations have been found to exist on the site. The site does however, provide some potential foraging and roosting habitat in the remnant vegetated areas on the site. The species deemed to have potential habitat on the site are detailed in Table 3 of this report.

The nectar-producing flora of the canopy provides a foraging resource for nectivorous threatened fauna including woodland birds, arboreal mammals and Flying Foxes. The fruit and seed of some plants may also provide foraging resources for some fauna. These trees will not be impacted as part of the proposal.

It is possible that some of the threatened Microchiropteran bat species may use the site for foraging. It is also feasible that some of the hollow-roosting species may use some of the hollows on site. These trees will not be impacted as part of the proposal and will be retained in the restriction.

The site does contain a small amount of fallen trees/limbs which may provide habitat for threatened terrestrial mammal species and/or reptile species, however due to the past and current disturbances the habitat is seen as sub-optimal.

It will be recommended that standard Council stormwater management principles be implemented on site to manage downstream receiving waters and that the vegetated areas on the southern portions of the site be retained and restriction as to user is implemented.

It is therefore considered unlikely that the proposed rezoning would result in any significant impacts on threatened species or communities known from the locality.

7.3 Consideration under SEPP 44 – 'Koala Habitat Protection'

Clauses 5 and 6 of the State Environmental Planning Policy 44 – 'Koala Habitat Protection' identify the land to which this policy applies. The land is contained with Gosford LGA (which is listed under Schedule 1) and is greater than 1 hectare in size (as per clause 6(c)) and therefore the SEPP applies to the site and proposed development.

First Consideration – Is the Land 'Potential Koala Habitat'?
Schedule 2 of State Environmental Planning Policy (SEPP) No. 44 – 'Koala Habitat Protection' lists 10 tree species that are considered indicators of 'Potential Koala Habitat'. The presence of any of the species listed on a site proposed for development triggers the requirement for an assessment for 'Potential Koala Habitat'. SEPP 44 defines potential Koala Habitat as:

"areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component"

No listed feed trees were found upon the site, therefore the site is not considered to constitute Potential Koala Habitat under SEPP 44 and no further provisions of the SEPP 44 apply.

8.0 RECOMMENDATIONS AND MANAGEMENT DETAILS

8.1 Habitat Fragmentation or isolation

The site contains and is part of a narrow strip of vegetation that runs along the southern boundary of the site. This narrow strip is deemed to be potential faunal corridor providing a linkage from the vegetation to the west through the site to the vegetation adjoining to the east. It is noted that to the east of the site, the vegetation is contained within a gully and important winter flowering species (*Eucalyptus robusta*) occur within this area. Fauna species may utilise the habitat corridor to travel to these areas to forage for food in the winter months and therefore this corridor should be retained. Therefore the following recommendation is made;

- A Restriction as to User pursuant to Section 88b of the Conveyancing Act should be created over the vegetation areas highlighted in Figure 4 to protected and retain the existing trees within this area. It is noted that understorey and ground clearing may occur to meet with the requirements for Bushfire Protection; however the larger trees shall remain.

8.2 Soil and Water Management during Construction

Construction of driveways and other infrastructure associated with the development will disturb local soils, increasing the potential for soil erosion and discharge of sediment-laden runoff off-site.

To address this erosion and sediment control plans may be required to accompany the Construction Certificate engineering designs for each development stage. ESCP's would be produced in accordance with Council requirements which typically reference *Managing Urban Stormwater, Soils and Construction, 3rd Edition, August 1998* (also known as 'the Blue Book'). Sediment and erosion control plans would typically contain a range of management practices, including:

- where possible, diversion of clean upslope run-on water around construction works
- stabilisation of denuded areas and earthworks batters as soon as practical after completion of the work
- minimising site disturbance by restricting machine access through demarcation
- limiting drainage paths using contour drains, silt fences and level spreaders
- installing sediment filters, such as silt fences, straw bales, or turf strips
- providing shaker pads near construction entries / exits to remove excess mud from truck tyres/underbodies
- provision of temporary sediment basins as necessary for the storage and flocculation of fine sediments if warranted by soil test results.
- Sediment controls should be put in place prior to any works and be maintained throughout the construction phase. This shall include such measures directly around stockpiles of spoil or soil.

8.3 Land Management

- Tree removal for any future dwelling should not occur within the southern portions of the allotment.

- Vegetation removal within the Restriction as to User area should only involve the removal of ground fuels as highlighted in the Bushfire Protection Assessment (Ecobiological, 2013)

- Noxious and significant environmental weeds such as Lantana should be controlled by standard Bush Regenerating Techniques and strict hygiene protocol to restrict the spreading of the species off-site

- Plant species used for landscaping should be restricted to locally-native species and / or those introduced species that do not have the potential to become environmental weeds.

9.0 CONSIDERATIONS UNDER THE EPBC ACT 1999

Considerations have been made to the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (*EP&BC Act 1999*). Searches of the Environment Australia On-line Database were undertaken to gather baseline data on the site and general locality. This data, combined with other local knowledge and records, was utilised to assess whether the type of activity proposed on the site will have, or is likely to have a significant impact upon a matter of National Environmental Significance (NES), or on the environment of Commonwealth land*.

*The site is not land owned by the Commonwealth, and hence this portion of the Act is not applicable. The matters of NES and site-specific responses are listed below.

- *World Heritage areas:*

The site is not a World Heritage area, and is not in close proximity to any such area.

- *Wetlands protected by international treaty (the Ramsar convention):*

The site is not part of any Ramsar Wetland area, and is not in proximity to any such area.

- *Nationally listed threatened species and ecological communities:*

No nationally listed threatened species and ecological communities have been recorded within the site. All potentially occurring threatened species and endangered ecological communities listed within the *EP&BC Act 1999* have been considered by this proposal specifically in relation to potential impacts under state legislation.

- *Nationally listed migratory species:*

No listed migratory species were observed during field surveys. It considered highly unlikely that future activity on the site would significantly affect populations or habitat availability for any listed migratory species, nor upset migratory patterns.

- *All nuclear actions:*

No type of nuclear activity is proposed for the site.

- *The environment of commonwealth marine areas:*

The proposed future activity on the site will not have a significantly adverse effect on any commonwealth marine area.

10.0 CONCLUSION

Clarke Dowdle and Associates have undertaken an ecological assessment on a parcel of land that is proposed to be rezoned so as to house two rural/residential allotments. .

In respect of matters required to be considered in the *Environment Protection and Biodiversity Conservation Act 1999*, the development was not deemed to significantly impact any of the Matters of National Significance. The proposed development therefore does not constitute a controlled action.

In respect of matters required to be considered under the *Environmental Planning and Assessment Act, 1979* and *Threatened Species Conservation Act*, it was deemed that the development would not significantly affect any threatened species, populations or ecological communities.
In respect of matters required to be considered under the *Fisheries Management Act*, there are no matters requiring further consideration.

The environmental impacts of the proposed development should be minimised through the adoption of the recommendations outlined in Section 8.0 of this report:

We would be pleased to provide further information on any aspects of this report.

For and behalf of
Clarke Dowdle & Associates

Kristan Dowdle
Ecologist

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FIGURE 1: LOCALITY MAP

FIGURE 2: SITE MAP

See Appendix A Figure 2-Site Map for approximate photo locations and direction

1.

2.

3.

4.

5.

6.

APPENDIX B FLORA SPECIES LIST

All species in the following flora list were recorded on the study site.

BuildSpeciesListWithFrequencies		
CAPS Number	**Family**	**DisplayName**
1106	Apiaceae	Centella asiatica
1195	Araceae	Gymnostachys anceps
1201	Araliaceae	Astrotricha floccosa
1211	Araliaceae	Polyscias sambucifolia
6458	Arecaceae	Archontophoenix cunninghamiana
8052	Blechnaceae	Blechnum cartilagineum
1907	Callitrichaceae	Callitriche muelleri
2017	Casuarinaceae	Allocasuarina torulosa
2035	Celastraceae	Maytenus silvestris
2209	Commelinaceae	Commelina cyanea
2222	Convolvulaceae	Dichondra repens
2432	Cyperaceae	Gahnia clarkei
6402	Cyperaceae	Lepidosperma laterale
8088	Davalliaceae	Nephrolepis cordifolia
7749	Dennstaedtiaceae	Hypolepis muelleri
6403	Dennstaedtiaceae	Pteridium esculentum
9360	Euphorbiaceae	Glochidion ferdinandi var. ferdinandi
11947	Euphorbiaceae	Homalanthus populifolius
2695	Euphorbiaceae	Breynia oblongifolia
Senn	Fabaceae (Caesalpinioideae)	Senna spp.
2861	Fabaceae (Faboideae)	Glycine tabacina
2860	Fabaceae (Faboideae)	Glycine clandestina
3792	Fabaceae (Mimosoideae)	Acacia implexa
3874	Fabaceae (Mimosoideae)	Acacia schinoides
3821	Fabaceae (Mimosoideae)	Acacia maidenii
3816	Fabaceae (Mimosoideae)	Acacia longifolia
3479	Lauraceae	Cryptocarya glaucescens
1925	Lobeliaceae	Pratia purpurascens
6308	Lomandraceae	Lomandra longifolia
3620	Loranthaceae	Muellerina eucalyptoides
6016	Luzuriagaceae	Geitonoplesium cymosum
6015	Luzuriagaceae	Eustrephus latifolius
3690	Menispermaceae	Stephania japonica
3931	Moraceae	Streblus brunonianus

BuildSpeciesListWithFrequencies		
CAPS Number	**Family**	**DisplayName**
11953	Myrsinaceae	Myrsine variabilis
4155	Myrtaceae	Eucalyptus pilularis
4171	Myrtaceae	Eucalyptus robusta
4177	Myrtaceae	Eucalyptus saligna
4283	Myrtaceae	Rhodamnia rubescens
4149	Myrtaceae	Eucalyptus paniculata
6688	Myrtaceae	Syncarpia glomulifera
7027	Myrtaceae	Eucalyptus acmenoides
3540	Phormiaceae	Dianella caerulea
4685	Pittosporaceae	Pittosporum undulatum
5219	Poaceae	Themeda australis
6540	Poaceae	Cynodon dactylon
5396	Proteaceae	Grevillea robusta
7686	Rhamnaceae	Alphitonia excelsa
Rubu	Rosaceae	Rubus spp.
7592	Smilacaceae	Smilax australis
6022	Smilacaceae	Smilax glyciphylla
6281	Vitaceae	Cayratia clematidea

Exotic

BuildSpeciesListWithFrequencies		
CAPS Number	**Family**	**DisplayName**
1123	Apiaceae	Hydrocotyle bonariensis
11784	Asparagaceae	Asparagus aethiopicus
1690	Asteraceae	Sonchus oleraceus
8788	Asteraceae	Hypochaeris radicata
1695	Asteraceae	Tagetes minuta
1283	Asteraceae	Bidens pilosa
1255	Asteraceae	Ageratina adenophora
6465	Asteraceae	Senecio madagascariensis
1698	Asteraceae	Taraxacum officinale
8688	Bignoniaceae	Jacaranda mimosifolia
10508	Commelinaceae	Tradescantia fluminensis
2761	Euphorbiaceae	Ricinus communis
3085	Fabaceae (Faboideae)	Trifolium repens
3471	Lauraceae	Cinnamomum camphora

BuildSpeciesListWithFrequencies		
CAPS Number	**Family**	**DisplayName**
3673	Malvaceae	Sida rhombifolia
4313	Oleaceae	Ligustrum sinense
4312	Oleaceae	Ligustrum lucidum
4613	Oxalidaceae	Oxalis corniculata
4643	Passifloraceae	Passiflora edulis
4661	Pinaceae	Pinus radiata
4699	Plantaginaceae	Plantago lanceolata
4748	Poaceae	Andropogon virginicus
4777	Poaceae	Arundo donax
5096	Poaceae	Pennisetum clandestinum
6090	Solanaceae	Solanum mauritianum
6248	Verbenaceae	Lantana camara
6256	Verbenaceae	Verbena bonariensis