Attachment 2 – Flora and Fauna Assessment

Environmental assessment (flora and fauna) of a development at Lot 6 DP 1128635, Razorback NSW

Prepared by

Woodlands Environmental Management
133 Forest Road, Wingello NSW 2579
ABN 93 036 995 658
Tel: (02) 48844255 **Mob**: 0422279946
Email: woodlandsenvironmental@yahoo.com.au

Prepared for

Samuel & Eleanor Cavanagh
c/o Precise Planning
152 Sailors Bay Road
Northbridge NSW 2063

16th October 2015

CONTENTS

Appendices

Report title	**Environmental assessment (flora and fauna) of a development at Lot 6 DP 1128635, Razorback NSW**
Date	16th October 2015
Report preparation	Woodlands Environmental Management 133 Forest Road, Wingello NSW 2579 ABN 93 036 995 658 **Tel**: (02) 48844255 **Mob**: 0422279946 **Email**: woodlandsenvironmental@yahoo.com.au Greg Stone – BAppSc (Parks, Recreation & Heritage), GradCert (Science Communication), AdvDip (Land Management), AssDip (Land Management)
Proponent	Samuel & Eleanor Cavanagh
Agent	Precise Planning
Client Address	152 Sailors Bay Road, Northbridge NSW 2063
Property Address	11 Westminster Place, Razorback NSW
Property Lot & DP	Lot 6 DP 1128635

1. Introduction and summary

Samuel & Eleanor Cavanagh propose a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. This report assesses the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species. An assessment of impacts on the proposed lot 3 will be provided as an annexure to this report.

A field survey and assessment was undertaken at the above location for the purpose of:

- assessing the likely effects of the development upon on flora and fauna at the site with particular regard to threatened species, populations or ecological communities, or their habitats,
- identifying opportunities to mitigate impacts,
- ensuring that the development results in no loss of biological diversity or ecological integrity and
- preparing Assessments of Significance as required

The survey, assessment and report was prepared with reference to NSW Office of Environment and Heritage *Threatened species survey and assessment guidelines* http://www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm

Summary

This report concludes that the development as proposed is unlikely to have a significant impact on threatened species, population, communities or their habitats.

Refer to **12. Conclusions and recommendations.**

2. Site location

Site location	The subject site is located at 11 Westminster Place, Razorback NSW. Refer Figure 1.
IBRA Bioregion	Sydney Basin
LGA	Wollondilly
CMA	Hawkesbury Nepean
CMA Sub-region	Cumberland

3. Subject site and study area

Subject site	The subject site is comprised of the building envelopes, Asset Protection Zones and access tracks for the proposed lots 1, 2 and 4 which will be directly affected by actions associated with the development. Refer Figure 3
Study area	The study area includes the subject site and any additional areas which are likely to be affected by the proposal, either directly, indirectly or cumulatively. Refer Figure 3

4. Site description

Landform	The subject site is located on a gentle to moderate slopes with a south to south-easterly aspect.
Elevation	c. 300m to 275m asl
Geology and soils	Liverpool Sub-group of Wianamatta Shales (shale with some sandstone beds). The soil is deep, fertile with moderate drainage.
Climate	Razorback is in a cool-sub humid zone, experiencing an average annual rainfall of 828mm with a fairly even distribution. Mean maximum temperature is 23° and mean minimum 10°C.
Vegetation	The subject site has been cleared of the original native forest / woodland vegetation and supports Modified Grassland dominated by exotic species classified as 'highly disturbed area with no or limited native vegetation'. The study area supports Modified Grassland and remnant patches of Forest Red Gum - Grey Box shrubby woodland.
Land use	The subject site is presently utilised for grazing cattle and horses. Structural developments have been undertaken within the proposed lot 5.

Adjoining properties	The subject site adjoins cleared large-lot residential properties to the north, and partially cleared remnant vegetation to the south, east and west.

5. Proposed development

Samuel & Eleanor Cavanagh propose a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. This report assesses the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species. An assessment of impacts on the proposed lot 3 will be provided as an annexure to this report. Refer Figures 2 and Appendix 3.

6. Statutory requirements

The report addresses the following statutory requirements of Commonwealth, State and Local governments:

Commonwealth	Environment Protection and Biodiversity Act 1999
State	Threatened Species Conservation Act 1995 Environmental Planning and Assessment Act 1979 Fisheries Management Act 1994 Native Vegetation Act 2003
Local	Wollondilly Local Environmental Plan (WLEP) 2011 Wollondilly Development Control Plan (WDCP) 2011

7. Reports consulted

Reference was made to the following consultants reports prepared in relation the development:

No consultants reports have been provided by the proponent

8. Flora survey and assessment

8.1 Database search

Reference was made to the following databases:

Atlas of NSW Wildlife (TSC Act) (incorporating Matters of National Environmental Significance (EPBC Act))	The Atlas of NSW Wildlife was used to produce a list of Threatened Species (species, populations and communities) known or predicted to occur within a selected study area within the Cumberland subregion and further refined to match habitat types. The Atlas includes species, populations and communities listed under the NSW *Threatened Species Conservation Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Refer Table 3 and Figure 6.
Vegetation Information System (VIS)	Reference was made to the NSW Vegetation Map Viewer, which provides online access for viewing vegetation maps held in the Vegetation

Information System (VIS) Map Catalogue administered by the Office of Environment and Heritage.

8.2 Field survey

Survey methodology	The flora survey was undertaken using transects, random meanders and targeted searches for Threatened Species. Refer Table 7.
Date/s of survey	16th October 2015
Survey personnel	Greg Stone
Survey constraints	Due to the highly modified structure and composition of the grassland, a 400m^2 quadrat was considered to be unnecessary. Three 100m transects were undertaken.
Stratification units	Modified Grassland (or Highly disturbed areas with no or limited native vegetation) within the subject site. Modified Grassland and Forest Red Gum - Grey Box shrubby woodland within the study area.
Existing vegetation mapping	The subject site is mapped as 'cleared land'. CumberlandPlain_GT10pc_E_2221 maps remnant vegetation within the study area as Moist Shale Woodland and Shale Hills Woodland, and Western Sydney Dry Rainforest.
Report vegetation mapping	Vegetation types located at the subject site as a result of the field survey are recorded in Figure 4.

8.3 Subject site vegetation

The descriptions of vegetation communities below include only dominant or common species. A full floristic list is found in Table 1: Flora species at Lot 6 DP 1128635, Razorback NSW

Description of Modified Grassland

Structure	Grassland dominated by exotic species
Overstorey	No overstorey is present
Mid-storey	No mid-storey is present
Groundcover	Groundcover includes the exotic species Kikuyu *Pennisetum clandestinum,* Clover *Trifolium repens,* Flatweed *Hypochaeris radicata* and Patterson's Curse *Echium plantagineum*
***Biometric* type**	Not applicable

***Biometric* formation**	Miscellaneous ecosystems: Highly disturbed areas with no or limited native vegetation
***Biometric* class**	Not applicable
Affiliated types	Not applicable
Condition	Not applicable
Conservation status	Not applicable
CMA regional cleared estimate	Not applicable
Representation in conservation reserves	Not applicable
Pre-1750 vegetation	Forest Red Gum - Grey Box shrubby woodland
Threatened Species	None
Comments	Scattered and isolated remnant overstorey trees are present at some locations with the Modified Grassland, but not within the subject site.

8.4 Study area vegetation

Description of Forest Red Gum - Grey Box shrubby woodland

Structure	Woodland with semi-mesic shrub layer and grassy groundcover.
Overstorey	The overstorey includes Forest Red Gum *Eucalyptus tereticornis,* Thin-leaved Stringybark *Eucalyptus eugenioides,* Grey Box *Eucalyptus moluccana* and Narrow-leaved Ironbark *Eucalyptus crebra.*
Mid-storey	The shrubby mid-storey includes dense patches of African Olive *Olea europaea* subspecies *cuspidate* and other exotic species such as Lantana *Lantana camara*, Large-leaved Privet *Ligustrum lucidum* and Small-leaved Privet *Ligustrum sinense*. Scattered natives including Hickory Wattle *Acacia implexa,* Coffee Bush *Breynia oblongifolia,* Hairy Clerodendrum *Clerodendrum tomentosum,* Snowy Daisy Bush *Olearia viscidula* and Blackthorn *Bursaria spinosa subsp. spinosa*. A patch of Flax-leaved Paperbark *Melaleuca linariifolia* is also present.
Groundcover	The sparse to moderately dense groundcover is generally dominated by weeds, but includes the native species Forest Hedgehog Grass *Echinopogon ovatus,* Weeping Grass *Microlaena stipoides var. stipoides,* Slender Tick Trefoil *Desmodium gunnii* and Cockspur Flower *Plectranthus*

	parviflorus. Weeds at the interface with the cleared subject site include Inkweed *Phytolacca octandra*, Patterson's Curse *Echium plantagineum*, Purpletop *Verbena bonariensis*, Fireweed *Senecio madagascariensis* and Scotch Thistle *Onopordum acanthium*.
***Biometric* type**	Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin
***Biometric* formation**	Grassy Woodlands
***Biometric* class**	Coastal Valley Grassy Woodlands
Affiliated types	GW p514 Cumberland Moist Shale Woodland (Tozer et al. 2006)
Conservation status	*Moist Shale Woodland in the Sydney Basin Bioregion* is listed as Endangered under the NSW *Threatened Species Conservation Act 1995.* *Western Sydney Dry Rainforest and Moist Woodland on Shale* is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
CMA regional cleared estimate	Forest Red Gum - Grey Box shrubby woodland is 75% cleared, and is therefore an over-cleared vegetation type.
Representation in conservation reserves	Less than 10ha of Forest Red Gum - Grey Box shrubby woodland is within conservation reserves (Tozer et al. 2006).
Pre-1750 vegetation	Forest Red Gum - Grey Box shrubby woodland.
Threatened Species	No threatened species were located.
Comments	Remnant Forest Red Gum - Grey Box shrubby woodland will not be impacted by the proposed development.

8.5 Assessment of impacts on flora

Forest Red Gum - Grey Box shrubby woodland	Potential direct, indirect and cumulative impacts are recorded in Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW

8.6 Discussion of flora impacts and issues

The impacts on flora are:
1. The clearing of c. 11,000m^2 of Modified Grassland dominated by exotic species. No threatened species or endangered ecological communities will be disturbed or cleared.

Refer to Table 6: Assessment and management of impacts.

9. Fauna survey and assessment

9.1 Database search

Reference was made to the following databases:

Atlas of NSW Wildlife (TSC Act) (incorporating Matters of National Environmental Significance (EPBC Act))	The Atlas of NSW Wildlife was used to produce a list of Threatened Species (species, populations and communities) known or predicted to occur within a selected study area within the Cumberland subregion and further refined to match habitat types. The Atlas includes species, populations and communities listed under the NSW *Threatened Species Conservation Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Refer Table 3 and Figure 6.

9.2 Field survey

Survey methodology	The fauna survey was based upon the identification of potential habitats for birds, mammals, reptiles and amphibians and opportunistic sightings of fauna or evidence of the presence of fauna. Further fauna survey methods (e.g. trapping) were not considered necessary due to the location and extent of existing habitat, the nature of the development and the degree of impact to be imposed upon the habitat. Details of survey methods and effort are recorded in Table 7: Survey methodology and effort at Lot 6 DP 1128635, Razorback NSW.
Date/s of survey	16th October 2015
Weather conditions	Weather was mild, and generally overcast with an occasional light sprinkling of rain. A light, easterly breeze present. The survey was undertaken between 2pm and 3pm.
Survey constraints	The timing and weather conditions may have limited the species of birds observed. To compensate for this constraint, results of a bird survey undertaken at the property on 30th June 2015 under more favourable conditions have been incorporated into this assessment.
Habitat mapping	Refer Figure 5: Habitat map at Lot 6 DP 1128635, Razorback NSW

9.3 Subject site habitats

Highly disturbed areas with no or limited native vegetation	Refer Figure 5: Habitat map at Lot 6 DP 1128635, Razorback NSW and Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW

9.4 Study area habitats

Highly disturbed areas with no or limited native vegetation	Refer Figure 5: Habitat map at Lot 6 DP 1128635, Razorback NSW and Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW
Coastal Valley Grassy Woodlands	

9.5 General habitat features

Wildlife corridors	The subject site and study area is located within a wildlife corridor of partially fragmented patches of remnant woodland within cleared grassland. Refer Figure 5.
SEPP 44 Koala habitat	The Wollondilly LGA is listed in Schedule 1 of *State Environmental Planning Policy No. 44 – Koala Habitat Protection*. *SEPP No. 44* requires that land in relation to which a development application has been made and which has an area of more than 1 hectare is subject to an assessment of whether it contains potential Koala habitat. Potential Koala habitat is an area of native vegetation where Koala feed tree species listed under Schedule 2 of SEPP No. 44 constitute at least 15% of the total number of trees in the upper and lower strata of the tree component. No Koala feed trees listed in Schedule 1 of SEPP no. 44, is present within the subject site. The subject is therefore not Core Koala Habitat.

9.6 Fauna observations

Fauna signs	No signs of fauna utilising the subject site were observed.
Fauna observed	Refer Table 2: Fauna observed at Lot 6 DP 1128635, Razorback NSW

9.7 Assessment of impacts on fauna

Highly disturbed areas with no or limited native vegetation	Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW

9.8 Discussion of fauna impacts and issues

The impacts on fauna are:
1. The clearing of c. 11,000m^2 of Modified Grassland habitat dominated by exotic species.

Refer to Table 6: Assessment and management of impacts.

9.9 Management of impacts

Avoiding impacts **Minimising impacts** **Mitigating impacts**	Potential direct, indirect and cumulative impacts are recorded in Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW

10. Assessments of Significance

Assessments have been prepared in accordance with *Threatened species assessment guidelines: The assessment of significance Department of Environment and Climate Change NSW* (2007). Assessments are recorded in Appendix 1.

Communities An Assessments of Significance has been prepared for the following community:

Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion

Flora Assessments of Significance have been prepared for the following species of flora:

No assessment required

Fauna Assessments of Significance have been prepared for the following species of fauna:

Circus assimilis	Spotted Harrier
Hieraaetus morphnoides	Little Eagle
Lathamus discolor	Swift Parrot
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Myotis macropus	Southern Myotis

11. Matters of National Environmental Significance (EPBC Act)

Western Sydney Dry Rainforest and Moist Woodland on Shale is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.* Remnants of the community are within the study area, but will not be impacted by the proposed development. A referral to the Minister is therefore not required.

12. Conclusion and recommendations

Conclusions

I. Samuel & Eleanor Cavanagh propose a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5.

II. This report assesses the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species.

III. An assessment of impacts on the proposed lot 3 will be provided as an annexure to this report.

IV. The vegetation to be cleared or disturbed is Modified Grassland dominated by exotic species classified as Highly disturbed areas with no or limited native vegetation.

V. *Moist Shale Woodland in the Sydney Basin Bioregion* Endangered Ecological Community is present within the study area, but will not be cleared or disturbed by the development as proposed.

VI. No threatened species of flora was located within the subject site

VII. No threatened species of fauna was located by the survey, however the subject site supports habitat suitable for, and potentially utilised by, six threatened species for foraging.

VIII. The Assessment of Significance for Moist Shale Woodland in the Sydney Bioregion concludes that the activities undertaken in association with the proposed development are unlikely to have any impact on the Endangered Ecological Community.

IX. Assessments of Significance for Spotted Harrier, Little Eagle, Swift Parrot, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis conclude that the activities undertaken in association with the proposed development are unlikely to have a significant impact on the threatened species or their habitat.

Recommendations

I. No recommendations

13. References

DEC (2004) *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft),* New South Wales Office of Environment and Heritage, Hurstville, NSW.

Department of Environment, Climate Change and Water NSW (2011) *Operational Manual for BioMetric* 3.1. Department of Environment, Climate Change and Water, NSW Sydney.

Gellie, N.J.H. (2005) *Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes and SE Corner bioregions.* Cunninghamia 9(2): 219-254

Groves, R.L. (ed) (1981) *The Vegetation of Australia* Cambridge University Press, Cambridge.

Leeper, G.W. (ed) *The Australian Environment*, CSIRO, 1970

Mitchell, P.B. (2002) *NSW ecosystems study: background and methodology.* Unpublished report to NSW National Parks and Wildlife Service, Hurstville.

Mitchell, P.B. (2003) *NSW ecosystems database mapping unit descriptions.* Unpublished report to NSW National Parks and Wildlife Service, Hurstville

NSW National Parks & Wildlife Service (2000) *Forest Ecosystem Classification and Mapping for the Southern CRA Region: A report undertaken for the NSW CRA/RFA Steering Committee.*

NSW National Parks & Wildlife Service (2002) *Identification guidelines for Endangered Ecological Communities* NSW National Parks and Wildlife Service, Hurstville, NSW

NSW National Parks & Wildlife Service (2004) *Moist Shale Woodland Community Profile* NSW National Parks and Wildlife Service, Hurstville, NSW

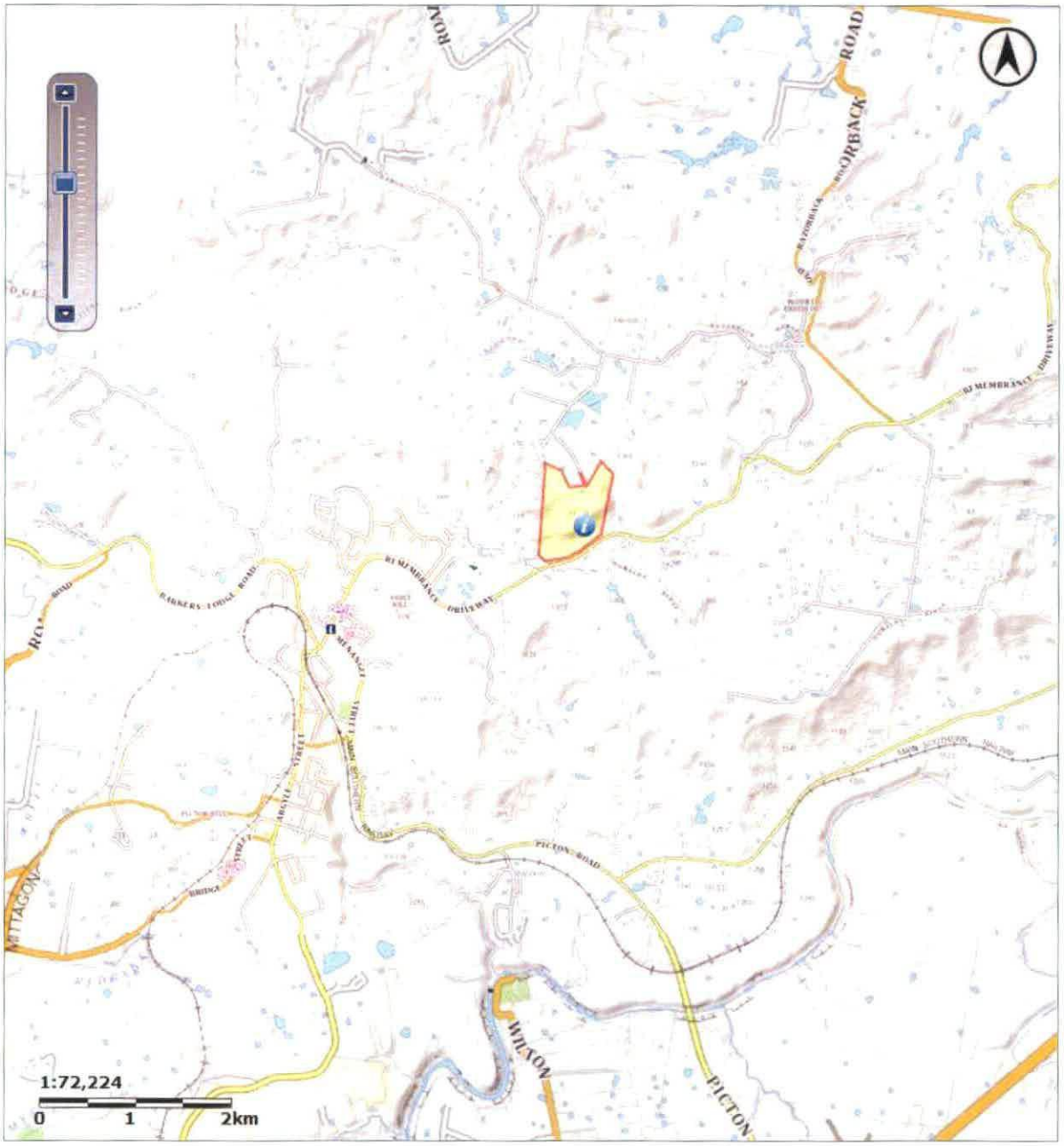
NSW Department of Infrastructure, Planning and Natural Resources (2004b) *Draft Native Vegetation Regulation 2004: Environmental Outcomes Assessment Methodology* NSW Government

Thomas V., Gellie N., and Harrison T. (2000) *Forest ecosystem classification and mapping for the southern Comprehensive Regional Assessment.* NSW National Parks and Wildlife Service, Queanbeyan

Tindall, D., Pennay, C., Tozer, M., Turner, K. and Keith, D. (2004). *Native vegetation map report series No. 4. The Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale Penrith, Port Hacking, Sydney, Taralga, Ulladulla and Wollongong 1:100,000 map sheets. Draft Version 1.0.* NSW Department of Infrastructure, Planning and Natural Resources and NSW Department of Conservation

Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2006) *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands.* Version 1.0,

Figure 1: Location of subject site for Lot 6 DP 1128635, Razorback NSW



Source: SIX Viewer

Figure 2: Proposed development plan at Lot 6 DP 1128635, Razorback NSW

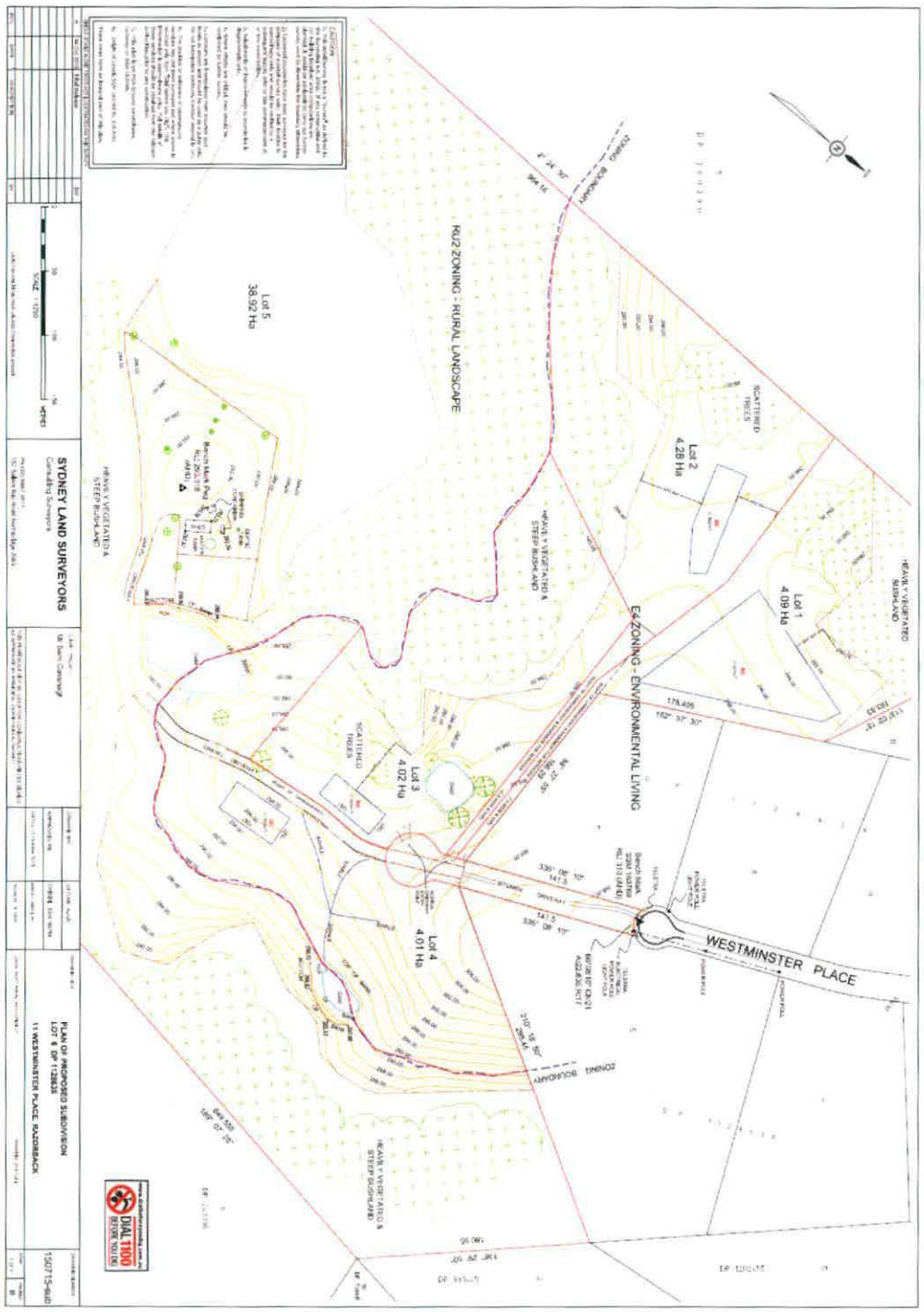
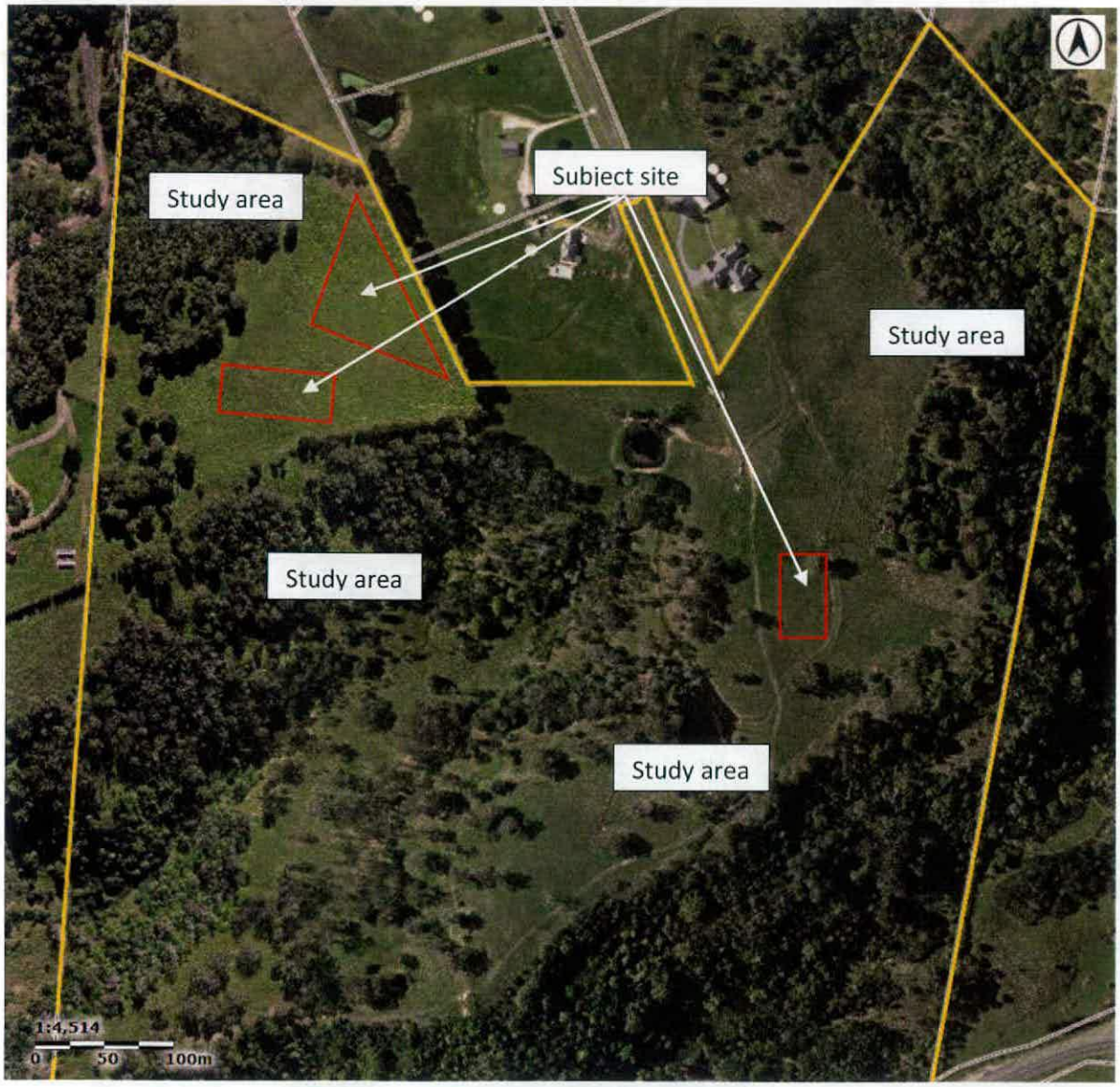
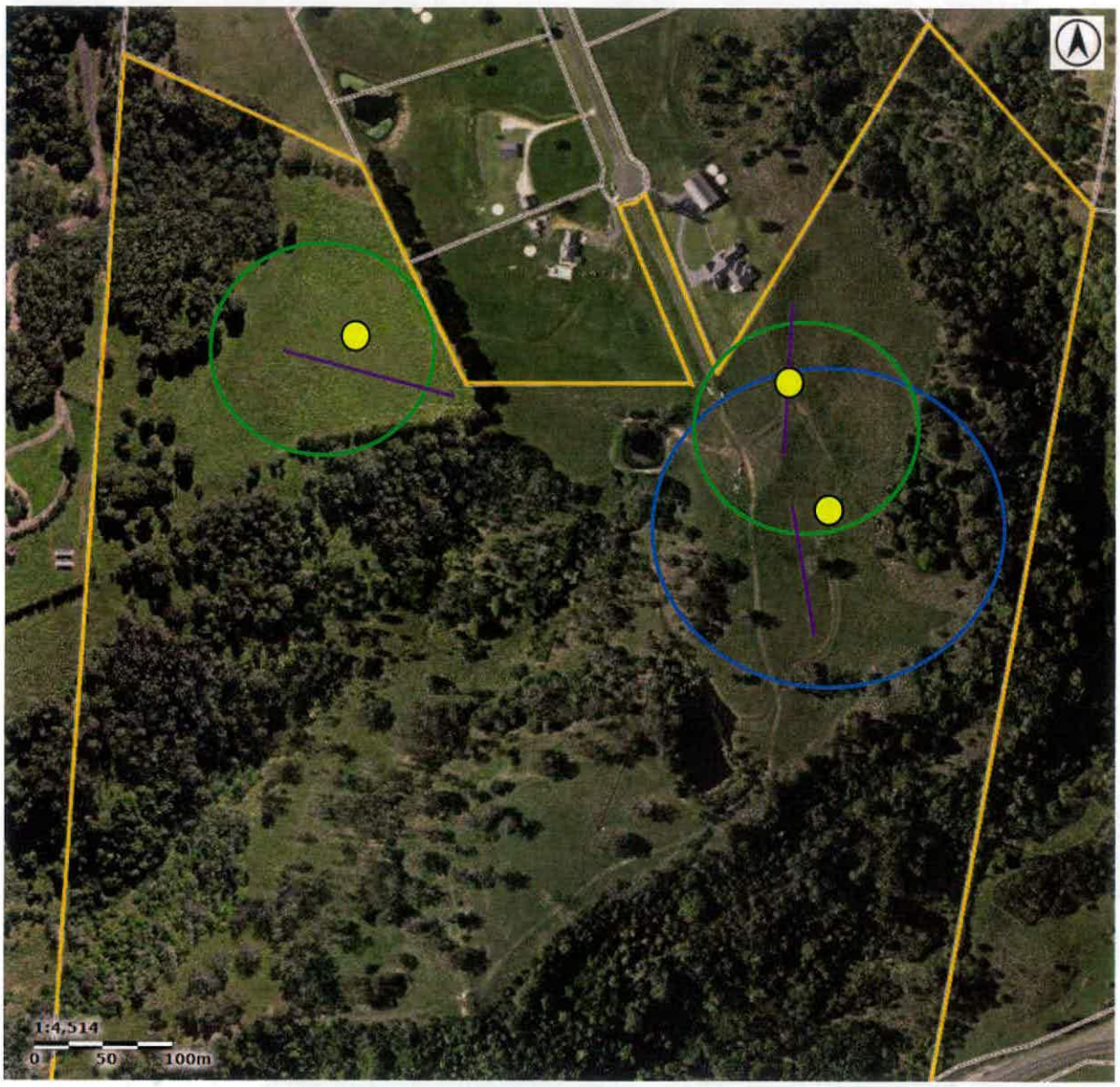


Figure 3: Subject site and study area at Lot 6 DP 1128635, Razorback NSW



Source: SIX Viewer

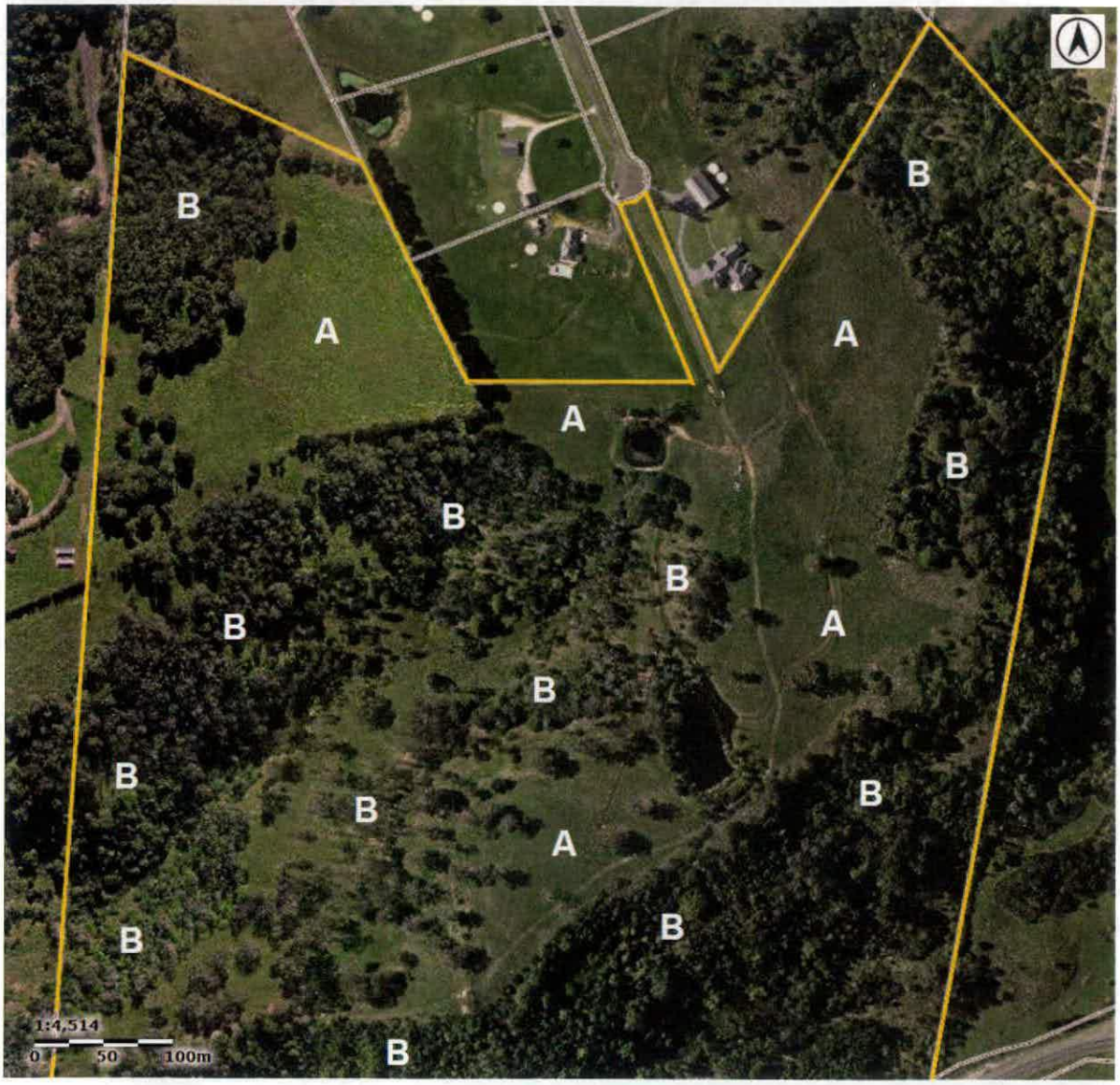
Figure 4: Survey map at Lot 6 DP 1128635, Razorback NSW



Source: SIX Maps

Blue: Bird census area **Purple**: 100m transect **Green**: Random meanders, targeted searches and habitat searches ◯ Photo points

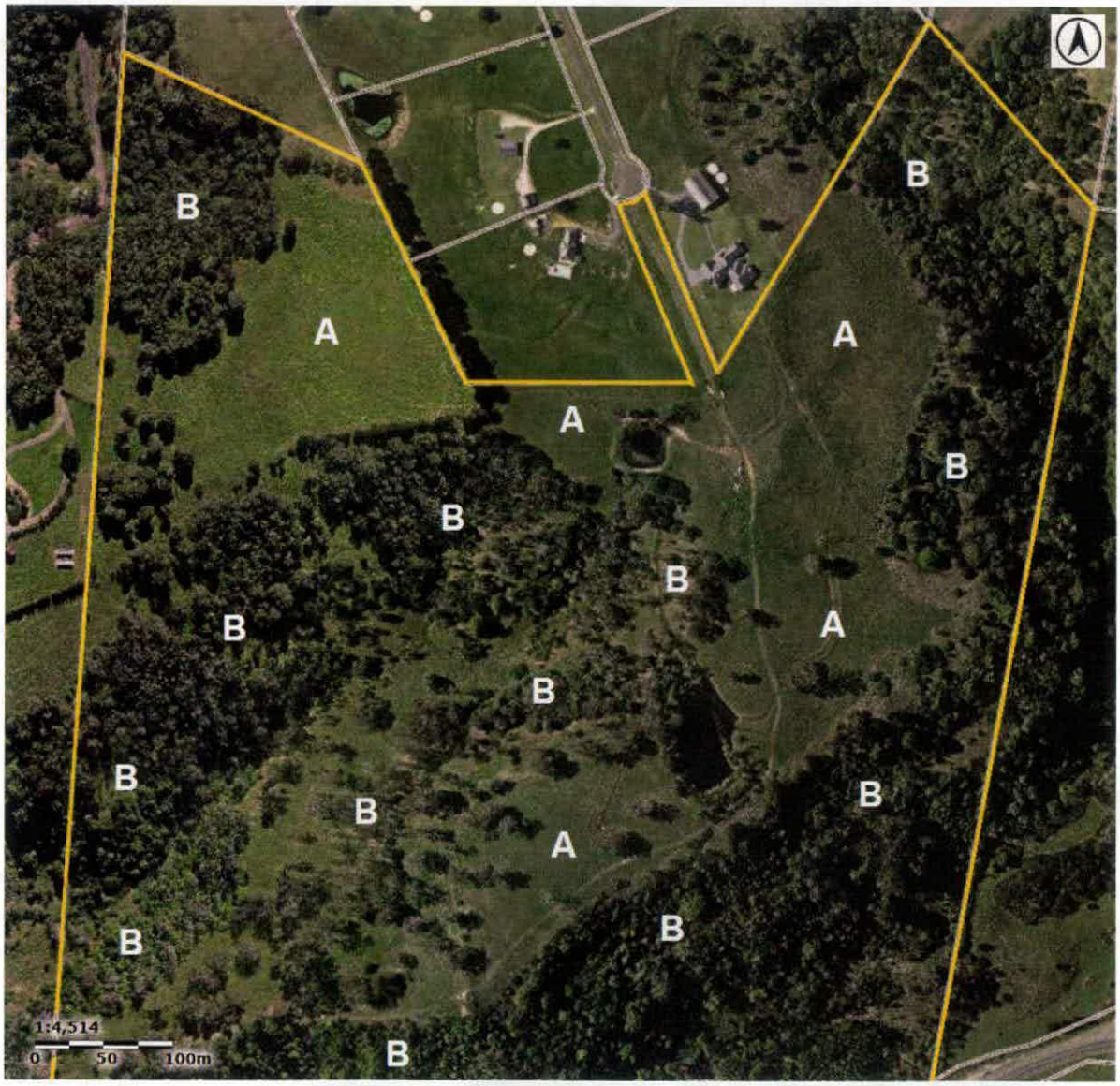
Figure 5: Vegetation map at Lot 6 DP 1128635, Razorback NSW



Source: SIX Viewer

A - Modified Grassland
B - Forest Red Gum - Grey Box shrubby woodland / Moist Shale Woodland EEC

Figure 6: Habitat map at Lot 6 DP 1128635, Razorback NSW



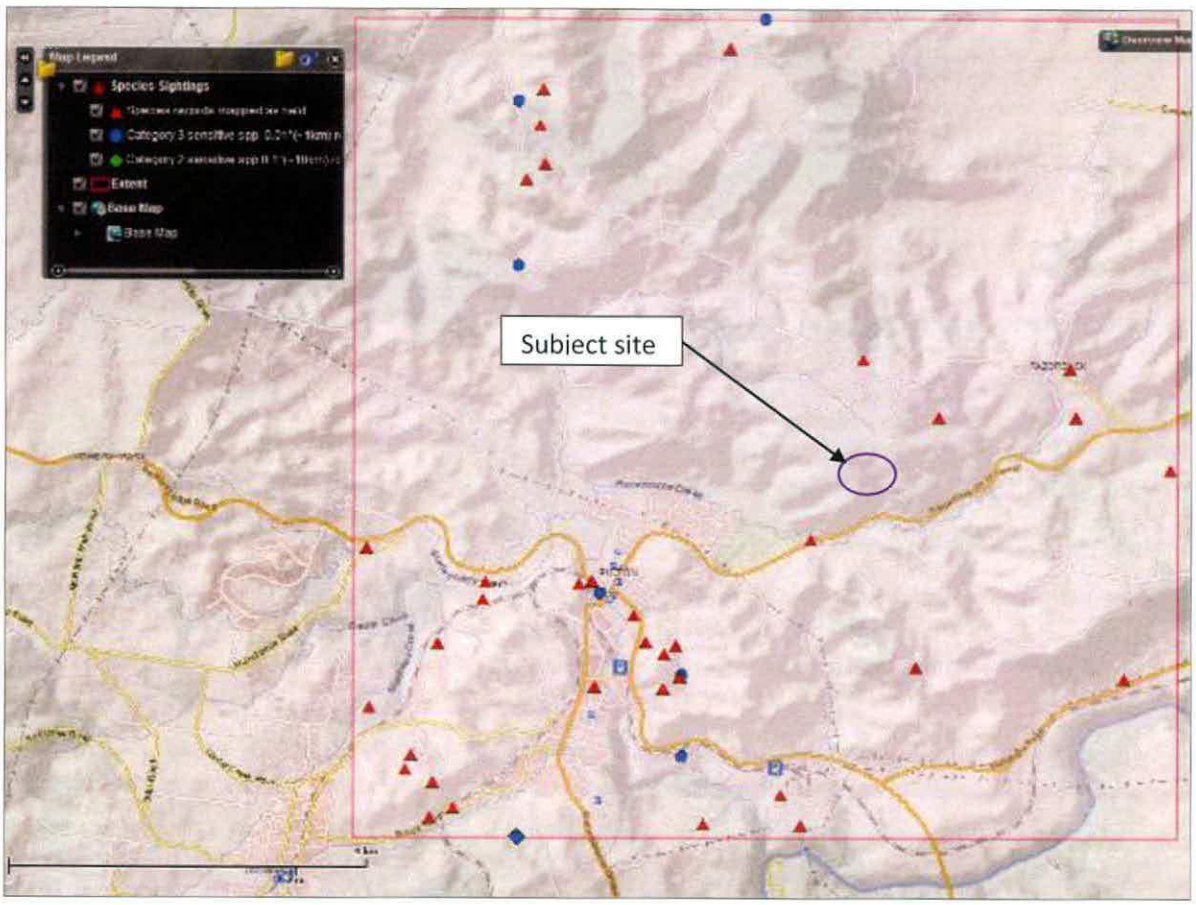
Source: SIX Viewer

A - Highly disturbed areas with no or limited native vegetation
B - Coastal Valley Grassy Woodlands

Figure 7: Wildlife Corridors

Source: SIX Viewer

Figure 8: Atlas of NSW Wildlife



Source: Atlas of NSW Wildlife

Table 1: Flora species at Lot 6 DP 1128635, Razorback NSW

Scientific Name	**Common Name**	**A**			
**Arctotheca calendula*	Capeweed	●			
**Bidens pilosa*	Cobbler's Peg	●			
**Centella asiatica*	Pennywort	●			
**Cirsium vulgare*	Spear Thistle	●			
**Echium plantagineum*	Patterson's Curse	●			
**Festuca sp.*	Fescue	●			
**Hypochaeris radicata*	Flatweed	●			
**Lolium perenne*	Perennial Rye	●			
**Myosotis sp.*	Forget Me Not	●			
**Onopordum acanthium*	Scotch Thistle	●			
**Oxalis tuberosa*	Oxalis	●			
**Paspalum distichum*	Paspalum	●			
**Pennisetum clandestinum*	Kikuyu	●			
**Petrorhagia nanteuilii*	Proliferous Pink	●			
**Plantago lanceolata*	Ribwort Plantain	●			
**Senecio madagascariensis*	Fireweed	●			
**Taraxacum officinale*	Dandelion	●			
**Trifolium repens*	Clover	●			
**Trifolium sp.*	Clover	●			
**Verbena bonariensis*	Purpletop	●			
Rumex brownii	Swamp Dock	●			
A – Highly disturbed areas with no or limited native vegetation (subject site)					
Note: Presence only of species within the subject site was recorded					

Table 2: Fauna observed at Lot 6 DP 1128635, Razorback NSW

Scientific Name	**Common Name**	**A**	**B**	
Zosterops lateralis	Silvereye		**O***	
Corcorax melanorhamphos	White-winged Chough		**O***	
Grallina cyanoleuca	Magpie-lark		**O***	
Rhipidura albiscapa	Grey Fantail		**O***	
Cracticus torquatus	Grey Butcherbird		**O***	
Philemon corniculatus	Noisy Friarbird		**O***	
Anthochaera carunculata	Red Wattlebird		**O* H**	
Cormobates leucophaea	White-throated Treecreeper		**O***	
Manorina melanocephala	Noisy Miner		**O* H**	
Platycercus eximius	Eastern Rosella	**o**	**O***	
Vanellus miles	Masked Lapwing	**O h**		
Wallabia bicolor	Swamp Wallaby	**o**		
A – Highly disturbed areas with no or limited native vegetation (subject site)				
B – Forest Red Gum - Grey Box shrubby woodland (study area)				
Subject site: o - observed **h** - heard call **s** - scats / signs **Study area: O** - observed **H** - heard call **S** - scats / signs * 30th June 2015				

Table 3: Threatened Species recorded in the Bionet Atlas of NSW Wildlife within 10km of Lot 6 DP 1128635, Razorback NSW

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -34.1 West: 150.57999999999998 East: 150.67999999999998 South: -34.2] returned a total of 57 records of 27 species.

Kingdom	Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		3
Animalia	Aves	Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V,P,3		1
Animalia	Aves	Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		4
Animalia	Aves	Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		3
Animalia	Aves	Psittacidae	*Lathamus discolor*	Swift Parrot	E1,P,3	E	1
Animalia	Aves	Strigidae	*Ninox connivens*	Barking Owl	V,P,3		1
Animalia	Aves	Strigidae	*Ninox strenua*	Powerful Owl	V,P,3		1
Animalia	Aves	Climacteridae	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		1
Animalia	Aves	Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V,P		2
Animalia	Aves	Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	E	3
Animalia	Aves	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1
Animalia	Aves	Petroicidae	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	V,P		1
Animalia	Aves	Petroicidae	*Petroica boodang*	Scarlet Robin	V,P		5

Animalia	Aves	Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V,P		1
Animalia	Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala	V,P	V	4
Animalia	Mammalia	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	1
Animalia	Mammalia	Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		1
Animalia	Mammalia	Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	3
Animalia	Mammalia	Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	V,P		1
Animalia	Mammalia	Vespertilionidae	*Myotis macropus*	Southern Myotis	V,P		1
Animalia	Gastropoda	Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		7
Plantae	Flora	Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E1,P	E	5
Plantae	Flora	Myrtaceae	*Eucalyptus macarthurii*	Paddys River Box, Camden Woollybutt	E1,P		1
Plantae	Flora	Polygonaceae	*Persicaria elatior*	Tall Knotweed	V,P	V	1
Plantae	Flora	Proteaceae	*Grevillea parviflora subsp. parviflora*	Small-flower Grevillea	V,P	V	1
Plantae	Flora	Proteaceae	*Persoonia bargoensis*	Bargo Geebung	E1,P	V	2
Plantae	Flora	Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E1,P	E	1

Commonwealth status

V – Vulnerable E – Endangered CE Critically Endangered EEC – Endangered Ecological Community EP – Endangered Population
K – Known to occur P – Predicted to occur

NSW Status

1 - Sensitivity Class 1 (Sensitive Species Data Policy)
2 - Sensitivity Class 2 (Sensitive Species Data Policy)
3 - Sensitivity Class 3 (Sensitive Species Data Policy)
E1 - Endangered (Threatened Species Conservation Act 1995)
E2 - Endangered Population (Threatened Species Conservation Act 1995)
E3 - Endangered Ecological Community (Threatened Species Conservation Act 1995)
E4A - Critically Endangered (Threatened Species Conservation Act 1995)
E4B - Critically Endangered Ecological Community (Threatened Species Conservation Act 1995)

P - Protected (National Parks & Wildlife Act 1974)
V - Vulnerable (Threatened Species Conservation Act 1995)
V2 - Vulnerable Ecological Community (Threatened Species Conservation Act 1995)

Table 4: Threatened Species associated with vegetation classes and habitats present at Lot 6 DP 1128635, Razorback NSW and recorded within Cumberland sub-region

Scientific Name	Common Name	NSW status	Comm. status	Status / Records	Present	Suitable veg. (1)	Suitable veg. (2)	Suitable veg. (3)	Suitable habitat	7-part test
Acacia bynoeana	Bynoe's Wattle	E	V	K						
Acacia pubescens	Downy Wattle	V	V	K						
Anthochaera phrygia	Regent Honeyeater	CE	E	K						
Burhinus grallarius	Bush Stone-curlew	E		K						
Callocephalon fimbriatum	Gang-gang Cockatoo	V		K						
Callocephalon fimbriatum - EP	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	EP		K						
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		K						
Cercartetus nanus	Eastern Pygmy-possum	V		K						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	K						
Chthonicola sagittata	Speckled Warbler	V		K						
Circus assimilis	Spotted Harrier	V		K		Yes			F	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		K						
Cumberland Plain Woodland in the Sydney Basin Bioregion	Cumberland Plain Woodland in the Sydney Basin Bioregion	CEEC	CE	K						
Cynanchum elegans	White-flowered Wax Plant	E	E	K						

Daphoenositta chrysoptera	Varied Sittella	V		K						
Dasyurus maculatus	Spotted-tailed Quoll	V	E	K						
Dillwynia tenuifolia	Dillwynia tenuifolia	V		K						
Dillwynia tenuifolia - EP	Dillwynia tenuifolia, Kemps Creek	EP		K						
Eucalyptus benthamii	Camden White Gum	V	V	K						
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		K						
Glossopsitta pusilla	Little Lorikeet	V		K						
Grantiella picta	Painted Honeyeater	V		K						
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	V		K						
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	CE	CE	P						
Hieraaetus morphnoides	Little Eagle	V		K		Yes			F	Yes
Hypsela sessiliflora	Hypsela sessiliflora	E	EX	K						
Ixobrychus flavicollis	Black Bittern	V		K						
Lathamus discolor	Swift Parrot	E	E	K		Yes			F	Yes
Litoria aurea	Green and Golden Bell Frog	E	V	K						
Lophoictinia isura	Square-tailed Kite	V		K						
Marsdenia viridiflora subsp. viridiflora - EP	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP		K						
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		K						
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		K						
Meridolum corneovirens	Cumberland Plain Land Snail	E		K						
Miniopterus australis	Little Bentwing-bat	V		K						
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V		K		Yes			F	Yes

Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion	EEC	CE	K						Yes
Mormopterus norfolkensis	Eastern Freetail-bat	V		K		Yes			F	Yes
Myotis macropus	Southern Myotis	V		K		Yes			F	Yes
Neophema pulchella	Turquoise Parrot	V		K						
Ninox connivens	Barking Owl	V		K						
Ninox strenua	Powerful Owl	V		K						
Pandion cristatus	Eastern Osprey	V		K						
Persicaria elatior	Tall Knotweed	V	V	K						
Persoonia bargoensis	Bargo Geebung	E	V	K						
Petaurus australis	Yellow-bellied Glider	V		K						
Petaurus norfolcensis	Squirrel Glider	V		K						
Petroica boodang	Scarlet Robin	V		K						
Petroica phoenicea	Flame Robin	V		K						
Phascolarctos cinereus	Koala	V	V	K						
Pilularia novae-hollandiae	Austral Pillwort	E		K						
Pimelea curviflora var. curviflora	Pimelea curviflora var. curviflora	V	V	K						
Pimelea spicata	Spiked Rice-flower	E	E	K						
Pomaderris brunnea	Brown Pomaderris	E	V	K						
Pommerhelix duralensis	Dural Woodland Snail	NL	E	K						
Pseudophryne australis	Red-crowned Toadlet	V		K						
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	K						
Pterostylis saxicola	Sydney Plains Greenhood	E	E	K						
Pultenaea parviflora	Pultenaea parviflora	E	V	K						
Pultenaea pedunculata	Matted Bush-pea	E		K						
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North	EEC		K						

Coast, Sydney Basin and South East Corner Bioregions	Coast, Sydney Basin and South East Corner Bioregions									
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		K						
Scoteanax rueppellii	Greater Broad-nosed Bat	V		K						
Stagonopleura guttata	Diamond Firetail	V		K						
Thesium australe	Austral Toadflax	V	V	K						
Tyto novaehollandiae	Masked Owl	V		K						
Tyto tenebricosa	Sooty Owl	V		K						
Wahlenbergia multicaulis - EP	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	EP		P						
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	Western Sydney Dry Rainforest in the Sydney Basin Bioregion	EEC	CE	K						

V – Vulnerable E – Endangered CE Critically Endangered EEC – Endangered Ecological Community EP – Endangered Population
K – Known to occur P – Predicted to occur N – Nesting or breeding habitat F – Foraging habitat

Vegetation class 1: Highly disturbed areas with no or limited native vegetation
Vegetation class 2: Coastal Valley Grassy Woodlands

Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW

Terrestrial habitat features	**A**			
Trees with loose bark				
Fallen timber and logs				
Rock escarpments				
Rock ledges or overhangs				
Caves				
Rocky outcrops				
Flat sandstone rocks & crevices				
Termite mounds				
Mammal burrows				
Mistletoe				
Bursaria or spiky shrubs				
Allocasuarina spp.				
River, stream, creek or gully				
Swamp, pond, wetland, dam, permanent soaks or seepages	R			
Corridors for plant or animal species				
Scats	R			
Whitewashing				
Bark scratching				
Nests, dens etc.				
Artificial habitats for bats				
Tree hollows and stags				
2-5 cm diameter				
5-10 cm diameter				
10-15 cm diameter				
15-20 cm diameter				
>20 cm diameter				
Stags				
A – Highly disturbed areas with no or limited native vegetation				
F – frequent C – common O – occasional R – rare C/P – clumps/patches				

Riparian habitat features			
In stream features		**Bank habitat**	
Snags		Vegetation	
Boulders		Erosion	
Pools		Rocks etc.	
Riffles		Logs etc.	
Bends		Burrows	
In stream vegetation		Stock access	
Fringing			
Emergent			
Submerged			
Floating			
F – frequent C – common O – occasional R – rare C/P – clumps/patches			

Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW

Action of activity	Nature and extent of potential impact	Recommendations for avoidance, minimisation, mitigation or offsetting of impact
Direct impacts		
Establishment of subdivision infrastructure on lots 1, 2 and 4.	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Establishment of proposed building envelopes and Asset Protection Zones within lots 1, 2 and 4.	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Indirect impacts		
Construction stage of the development	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Occupational stage of the development	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Cumulative impacts		
Direct and indirect impacts of the construction and occupational stages of the development.	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.

Table 7: Survey methodology and effort

	Method	Details	Date	Suggested minimum effort Draft Assessment Guidelines (2004)
Flora	0 x 400m^2 (1000m^2) Biometric quadrats	Floristics and structure		1 x 400m^2 (1000m^2) quadrat per stratification unit <2 hectares, 3 plots for 5-20ha, 4 plots for 21-50ha, 5 plots for 51-100ha
	2 x random meanders / targeted searches	Search for Threatened Species	14th October 2015	30 minutes for each quadrat sampled within the same stratification unit as the quadrat
	3 x 100m transects	Additional floristics	14th October 2015	1x100m traverse per stratification unit <2 hectares, 3 transects for 5-20ha, 4 transects for 21-50ha, 5 transects for 51-100ha
Fauna	1 x 20 minute bird survey	Record of sightings	14th October 2015 30th June 2015	"A 1ha (200m x 500m) 20-minute search is the most common method" (p. 80)
	2 x survey of habitats	Search for tree hollows, stags, fallen timber, rock features, burrows, vegetation, termite mounds etc.	14th October 2015	Not specified. 30 minutes per stratification unit
	2 x survey for fauna signs	Search for scats, tracks scratchings, nests, burrows, tree scarring, white-washing etc.	14th October 2015	30 minutes searching each relevant habitat or stratification unit, including trees for scats, scratch marks, whitewashing etc.

Table 8: Survey and photo locations at Lot 6 DP 1128635, Razorback NSW

Photographs	Photo-point	Vegetation type	Grid reference	Description and notes
1-5	1	Modified Grassland	56 H 282139 6217868	Looking north, south, east and west. Characteristic groundcover.
6-10	2	Modified Grassland	56 H 282563 6218078	Looking north, south, east and west. Characteristic groundcover.
11-15	3	Modified Grassland	56 H 282472 6217746	Looking north, south, east and west. Characteristic groundcover.

See Figure 4: Survey map at Lot 6 DP 1128635, Razorback NSW

Appendix 1: Assessments of Significance at Lot 6 DP 1128635, Razorback NSW

Introduction

Threatened species impact assessment is an integral part of environmental impact assessment. The objective of s. 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *assessment of significance*, is to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats through the planning and assessment process, and to ensure that the consideration is transparent.

Assessments have been prepared in accordance with *Threatened species assessment guidelines: The assessment of significance Department of Environment and Climate Change NSW* (2007).

This report therefore assesses the likely impacts of the proposed development on the following species:

Scientific Name	**Common Name**
Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion
Circus assimilis	Spotted Harrier
Hieraaetus morphnoides	Little Eagle
Lathamus discolor	Swift Parrot
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Myotis macropus	Southern Myotis

Assessment for:

Moist Shale Woodland in the Sydney Basin Bioregion — Moist Shale Woodland in the Sydney Basin Bioregion

Description of the proposed development

The development proposed is a five lot residential subdivision with building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species.

Species or Community information

Description

Similar to Cumberland Plain Woodland. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Forest Red Gum *Eucalyptus tereticornis*, Grey Box *E. moluccana*, Narrow-leaved Ironbark *E. crebra* and Spotted Gum *Corymbia maculata*. Small trees, such as Hickory Wattle *Acacia implexa* and Sydney Green Wattle *A. parramattensis* subsp. *parramattensis* are also common. The shrub layer includes *Breynia oblongifolia*, Hairy Clerodendrum *Clerodendrum tomentosum* and Indian Weed *Siegesbeckia orientalis* subsp. *orientalis*. Contains many more species and other references should be consulted to identify these. This community is listed as Critically Endangered under the "Western Sydney Dry Rainforest and Moist Woodland on Shale" in the EPBC Act.

Distribution

Moist Shale Woodland usually occurs on soils derived from Wianamatta Shale on high country in the southern half of the Cumberland Plain, and occurs mainly in Wollondilly local government area. Also occurs in smaller amounts further north in the Camden, Campbelltown, Fairfield, Liverpool and Penrith local government areas. There are 604 ha remaining intact. A small remnant can be seen in Western Sydney Regional Park.

Habitat and ecology

- Mainly occurs in the hilly country with higher elevations where there is increased rainfall.
- Occurs on clay soils derived from Wianamatta shale and is intermediate between Cumberland Plain Woodland on drier sites and Western Sydney Dry Rainforest on wetter sites.
- Understorey shrubs in moist habitats are sensitive to fire and would be lost from the community with frequent fire.
- The shrubs and trees of Moist Shale Woodland provide excellent habitat for birds and insects, and provide ideal nesting hollows for mammals and birds.

Source: OEH Threatened Species profile
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10539

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

Comments

Individual species are assessed below.

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

Comments

No endangered population is present within the subject site or study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

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

Comments

No Moist Shale Woodland will be cleared or disturbed by the development as proposed.

(d) in relation to the habitat of a threatened species, population or ecological community:

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

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

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

Comments
No Moist Shale Woodland will be cleared or disturbed by the development as proposed.

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

Comments
No critical habitat is present within the subject site or study area.

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

Comments
A recovery plan has been prepared for Moist Shale Woodland i.e.
Department of Environment, Climate Change and Water (NSW) (2011) *Cumberland Plain Recovery Plan*, Department of Environment, Climate Change and Water (NSW), Sydney.

The recovery objectives of The Plan are:
1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands
2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner

The subject site is not located within the Priority Conservation Lands identified by The Plan.

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

Comments
No actions to be undertaken are likely to result in the operation of Key Threatening Processes listed under Schedule 3 of the TSC Act (1995).

Conclusion

The Assessment of Significance concludes that the activities undertaken in association with the proposed development are unlikely to have any impact on Moist Shale Woodland.

Assessment for:	
Circus assimilis	Spotted Harrier
Hieraaetus morphnoides	Little Eagle
Lathamus discolor	Swift Parrot
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Myotis macropus	Southern Myotis

Description of the proposed development

The development proposed is a five lot residential subdivision with building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species.

Species or Community information

Spotted Harrier *Circus assimilis* occurs throughout the Australian mainland, except in densly forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.

Spotted Harrier occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. It builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Spotted Harrier preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.

Little Eagle *Hieraaetus morphnoides* occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living rees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.

Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW

Swift Parrot *Lathamus discolor* migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Returns to home foraging sites on a cyclic basis depending on food availability.
Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *E. globulus*.

Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.

For Eastern Bentwing Bat *Miniopterus schreibersii oceanensis* caves are the primary roosting habitat, but the species also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Bentwing Bats form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young, but at other times populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. The bats hunt in forested areas, catching moths and other flying insects above the tree tops.

Eastern Bentwing Bat occurs along the east and north-west coasts of Australia.

Eastern Free-tail Bat *Mormopterus norfolkensis* occurs in dry sclerophyll forest and woodland east of the Great Dividing Range and roosts mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.

Eastern Free-tail Bat is found along the east coast from south Queensland to southern NSW.

Southern Myotis *Myotis macropus* generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The bats forage over streams and pools catching insects and small fish by raking their feet across the water surface.

Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.

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

Comments
The above fauna species would potentially utilise the Modified Grassland habitat of the subject site for foraging only, as suitable breeding or nesting habitat occurs only within the study area. The loss of 11,000m^2 of Modified Grassland habitat is unlikely to have an adverse effect on the life cycle of any of the species such that a viable local population of any of the species is likely to be placed at risk of extinction as extensive areas of remnant habitat adjoin the subject site.

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

Comments
No endangered population is present within the subject site or study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

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

Comments
Moist Shale Woodland is assessed above.

(d) in relation to the habitat of a threatened species, population or ecological community:
i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Comments
The above fauna species would potentially utilise the Modified Grassland habitat of the subject site for foraging only, as suitable breeding or nesting habitat occurs only within the study area. i) c. 11,000m^2 of Modified Grassland habitat is to be cleared or disturbed. ii) The action will not fragment or isolate areas of habitat due to the presence of extensive areas of similar habitat within the locality. Iii) The habitat to be removed, is not considered important to the long-term survival of the species in the locality as it represents only a small portion of foraging habitat, and not breeding or nesting habitat.

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

Comments
No critical habitat is present within the subject site or study area.

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

Comments
No recovery plans or threat abatement plan have been prepared for the species.

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

Comments
No actions to be undertaken are likely to result in the operation of Key Threatening Processes listed under Schedule 3 of the TSC Act (1995).

Conclusion

Assessments of Significance conclude that actions undertaken in association with the development is unlikely to have a significant impact on the threatened species Spotted Harrier, Little Eagle, Swift Parrot, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis and their habitats.

References

NSW NPWS (2003) *Saving out threatened native animals and plants: Recovery and threat abatement in action - 2003 update* NSW National Parks and Wildlife Service, Hurstville,

Appendix 2: Vegetation condition

Vegetation condition benchmarks are described for a suite of condition variables by vegetation type at the scale of the stand or patch. Benchmarks are used in *BioMetric* as yardsticks against which to assess the current condition of native vegetation. Each condition variable is allocated a score from 0-3 (0=low, 1=moderate, 2=high, 3=very high) based on the difference between its measured value and its benchmark. This scoring system is explained in the *BioMetric* Operational Manual (Version 3.1 - updated February 2011) (PDF - 6.0 MB).

The method of data collection is as described in Appendix 3 of Department of Environment, Climate Change and Water NSW (2011) *Operational Manual for BioMetric* 3.1. Department of Environment, Climate Change and Water, NSW Sydney.

Vegetation community	Native plant species richness	Native overstorey cover %	Native mid-storey cover %	Native ground-cover (grasses) %	Native ground-cover (shrubs) %	Native ground-cover (other) %	Lack of exotic plant cover (calculated as % of total ground and mid-storey cover)	Number of trees with hollows	Proportion of over-storey species occurring as regeneration	Total length of fallen logs	Score / Condition
Highly disturbed areas with no or limited native vegetation benchmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix 3: Photographs at Lot 6 DP 1128635, Razorback NSW

Photo 1: Photo-point 1 looking north over the proposed Lot 1.

Photo 2: Photo-point 1 looking south over the proposed Lot 2.

Photo 3: Photo-point 1 looking east.

Photo 4: Photo-point 1 looking west.

Photo 5: Photo-point 1 groundcover

Photo 6: Photo-point 2 looking north over the proposed Lot 4.

Photo 7: Photo-point 2 looking south over the proposed Lot 4.

Photo 8: Photo-point 2 looking east.

Photo 9: Photo-point 2 looking west.

Photo 10: Photo-point 2 groundcover

Photo 11: Photo-point 3 looking north.

Photo 12: Photo-point 3 looking south.

Photo 13: Photo-point 3 looking east.

Phot 14: Photo-point 3 looking west.

Photo 15: Photo-point 3 groundcover

Appendix 4: Certification

Woodlands

Environmental Management

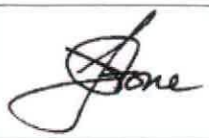
Forest Road, Wingello, NSW, 2579

Tel. (02) 488 44255 Mobile 0422279946

E-mail: woodlandsenvironmental@yahoo.com.au

ABN 93036995658

Report title:	Environmental assessment (flora and fauna) of a development at Lot 6 DP 1128635, Razorback NSW
Report prepared by:	Greg Stone, Woodlands Environmental Management
Qualifications:	BAppSc (Parks, Recreation & Heritage), GradCert (Science Communication), AdvDip (Land Management), AssDip (Land Management)
Address:	Woodlands Environmental Management 133 Forest Road, Wingello, NSW 2579
Applicant Name:	Samuel & Eleanor Cavanagh
Applicant Address:	152 Sailors Bay Road, Northbridge NSW 2063
Land developed:	Lot 6 DP 1128635, Razorback NSW
Development:	Samuel & Eleanor Cavanagh propose a five lot residential subdivision with building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4, requiring the clearing or disturbance of c. 11,000m^2 of Modified Grassland dominated by exotic species. An assessment of impacts on the proposed lot 3 will be provided as an annexure to this report.
Certification:	I certify that I have prepared the contents of this report and to the best of my knowledge: • It reports on the potential impacts of the proposal as generally outlined in the concept application; • It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Disclaimer:	This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person including the client then Woodlands Environmental Management advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be interpreted without reference to the entire report.

	The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.
Signature:	
Name:	Gregory John Stone
Date:	16th October 2015

Appendix 5: Curriculum Vitae, licensing and insurance

Woodlands Environmental Management is an environmental consultancy operating within South East NSW.

Principal

Greg Stone is the principal partner of Woodlands Environmental Management.

Greg's qualifications are:

Bachelor of Applied Science (Parks, Recreation and Heritage) Charles Sturt University
Graduate Certificate in Science Communication Australian National University
Master of Environmental Management (candidate) Charles Sturt University
Advanced Diploma in Land Management University of Sydney
Associate Diploma in Land Management University of New England

In addition to private consultancy, Greg has previously worked under contract with **Hawkesbury-Nepean Catchment Management Authority** for administering the *Native Vegetation Act 2003* and undertaking assessments for Property Vegetation Plans, and co-ordinating the Southern Highlands and Tablelands Biolinks project including incentive, community education and conservation programs.

Greg is presently contracted to NSW **Office of Environment and Heritage**'s Conservation Partners Program for the assessment and preparation of Conservation Agreements and Wildlife Refuges with private landholders on properties of high conservation value across south-east NSW.

Several qualified and experienced ecologists, zoologists and botanists are also utilised by Woodlands Environmental Management to provide expertise as required.

Services

Woodlands Environmental Management provides the following services:

- **Environmental Impact Assessments** for flora and fauna in accordance with *Environmental Planning and Assessment Act 1979,* the *Threatened Species Conservation Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- **Assessments of Significance** (7 part tests) in accordance with *Environmental Planning and Assessment Act 1979* and Office of Environment & Heritage *Threatened species assessment guidelines: The assessment of significance*
- **Vegetation Management Plans** for conservation, rehabilitation or revegetation
- **Offset Management Plans** in accordance with Office of Environment & Heritage *Principles for the use of biodiversity offsets in NSW*
- **Conservation Agreements** and **Wildlife Refuges** under contract to NSW Office of Environment & Heritage in accordance with the *National Parks & Wildlife Act 1974*.
- **Pre-development or Pre-purchase Environmental Constraints Reports**

- **Weed Eradication and Management Plans** for noxious and environmental weeds
- **Vegetation Community and Threatened Species Survey and Mapping**
- **Delivery of lectures, training programmes, workshops and field days** on a range of environmental subjects to government agencies and community groups

Local Government Areas

Woodlands Environmental Management has operated within the following LGAs:

Bega Valley, Blue Mountains, Bombala, Campbelltown, Cooma Monaro, Cowra, Eurobodalla, Goulburn Mulwaree, Hawkesbury, Liverpool, Palerang, Queanbeyan, Shoalhaven, Wingecarribee, Wollondilly, Wollongong, Yass Valley and Young.

Insurances

Woodlands Environmental Management is insured for the following:

- Public and Products Liability Insurance of up to $10,000,000
- Professional Indemnity of up to $10,000,000

Licence

Woodlands Environmental Management operates under a Scientific Licence issued under the National Parks & Wildlife Act 1974
Licence number is: SL101033
Class Name: Biodiversity assessment / Species Impact Statement and Ecological survey/consultancy

Environmental assessment (flora and fauna) for a proposed development at Lot 6 DP 1128635, Razorback NSW (Annexure)

Prepared by

Woodlands Environmental Management
133 Forest Road, Wingello NSW 2579
ABN 93 036 995 658
Tel: (02) 48844255 **Mob**: 0422279946
Email: woodlandsenviro@gmail.com

Prepared for

Samuel & Eleanor Cavanagh
Precise Planning
152 Sailors Bay Road
Northbridge NSW 2063

22nd October 2015

CONTENTS

Appendices

Report title	**Environmental assessment (flora and fauna) for a proposed development at Lot 6 DP 1128635, Razorback NSW (Annexure)**
Date	22nd October 2015
Report preparation	Woodlands Environmental Management 133 Forest Road, Wingello NSW 2579 ABN 93 036 995 658 **Tel**: (02) 48844255 **Mob**: 0422279946 **Email**: woodlandsenviro@gmail.com Greg Stone – BAppSc (Parks, Recreation & Heritage), GradCert (Science Communication), AdvDip (Land Management), AssDip (Land Management)
Proponent	Samuel & Eleanor Cavanagh
Agent	Precise Planning
Client Address	152 Sailors Bay Road Northbridge NSW 2063
Property Address	11 Westminster Place, Razorback NSW
Property Lot & DP	Lot 6 DP 1128635

1. Introduction and summary

Samuel & Eleanor Cavanagh propose a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. A previous report (Woodlands Environmental Management, 16th October 2015) assessed the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4. As an annexure, this report assesses impacts on the proposed lot 3.

A field survey and assessment was undertaken at the above location for the purpose of:

- assessing the likely effects of the proposed development upon on flora and fauna at the site with particular regard to threatened species, populations or ecological communities, or their habitats,
- identifying opportunities to avoid, minimise or mitigate impacts,
- developing appropriate offsets,
- ensuring that the development results in no loss of biological diversity or ecological integrity and
- preparing Assessments of Significance as required

The survey, assessment and report was prepared with reference to NSW Office of Environment and Heritage *Threatened species survey and assessment guidelines* http://www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm

Summary

This report concludes that the development as proposed is unlikely to have a significant impact on threatened species, population, communities or their habitats.

Refer to **12. Conclusions and recommendations.**

2. Site location

Site location	The subject site is located at 11 Westminster Place, Razorback NSW. Refer Figure 1.
IBRA Bioregion	Sydney Basin
LGA	Wollondilly
CMA	Hawkesbury Nepean
CMA Sub-region	Cumberland

3. Subject site and study area

Subject site	The subject site includes the c. 1,000m^2 building envelope, associated Asset Protection Zone and access track for the proposed lot 3 i.e. the area to be directly affected by the proposed development. Refer Figure 3
Study area	The study area includes the subject site and any additional areas which are likely to be affected by the proposal, either directly, indirectly or cumulatively. Refer Figure 3

4. Site description

Landform	The subject site is located on a gentle to moderate slope with a south to south-easterly aspect.
Elevation	c. 300m asl
Geology and soils	Liverpool Sub-group of Wianamatta Shales (shale with some sandstone beds). The soil is deep, fertile with moderate drainage.
Climate	Razorback is in a cool-sub humid zone, experiencing an average annual rainfall of 828mm with a fairly even distribution. Mean maximum temperature is 23° and mean minimum 10°C.
Vegetation	The subject site supports Modified Grassland and remnant patches of Forest Red Gum - Grey Box shrubby woodland. The study area supports Modified Grassland and remnant patches of Forest Red Gum - Grey Box shrubby woodland.
Land use	The subject site is presently utilised for grazing cattle and horses.
Adjoining properties	The property adjoins cleared large-lot residential properties to the north, and partially cleared remnant vegetation to the south, east and west.

5. Proposed development

The development as proposed is a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. A previous report (Woodlands Environmental Management, 16th October 2015) assessed the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4. As an annexure, this report assesses impacts on the proposed lot 3. Refer Figure 2

6. Statutory requirements

The report addresses the following statutory requirements of Commonwealth, State and Local governments:

Commonwealth	Environment Protection and Biodiversity Act 1999
State	Threatened Species Conservation Act 1995 Environmental Planning and Assessment Act 1979 Fisheries Management Act 1994 Native Vegetation Act 2003
Local	Wollondilly Local Environmental Plan (WLEP) 2011 Wollondilly Development Control Plan (WDCP) 2011

7. Reports consulted

Reference was made to the following consultants reports prepared in relation the development:

Bushfire Assessment Report for Proposed Subdivision of Lot 6 DP 1128635 11 Westminster Place Razorback NSW 2571 by Australian Bushfire Solutions, October 2015

8. Flora survey and assessment

8.1 Database search

Reference was made to the following databases:

Atlas of NSW Wildlife (TSC Act) (incorporating Matters of National Environmental Significance (EPBC Act))	The Atlas of NSW Wildlife was used to produce a list of Threatened Species (species, populations and communities) known or predicted to occur within a selected study area within the Cumberland subregion and further refined to match habitat types. The Atlas includes species, populations and communities listed under the NSW *Threatened Species Conservation Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Refer Table 3 and Figure 8.
Vegetation Information System (VIS)	Reference was made to the NSW Vegetation Map Viewer, which provides online access for viewing vegetation maps held in the Vegetation Information System (VIS) Map Catalogue administered by the Office of Environment and Heritage.

8.2 Field survey

Survey methodology	The flora survey was undertaken using quadrats, transects, random meanders and targeted searches for Threatened Species. Refer Table 7.
Date/s of survey	16th October 2015
Survey personnel	Greg Stone
Survey constraints	No constraints
Stratification units	Modified Grassland (or Highly disturbed areas with no or limited native vegetation) Forest Red Gum - Grey Box shrubby woodland
Existing vegetation mapping	CumberlandPlain_GT10pc_E_2221 maps remnant vegetation within the subject site as Moist Shale Woodland and Shale Hills Woodland, and Western Sydney Dry Rainforest.
Report vegetation mapping	Vegetation types located at the subject site as a result of the field survey are recorded in Figure 5

8.3 Subject site vegetation

The descriptions of vegetation communities below include only dominant or common species. A full floristic list is found in Table 1: Flora species at Lot 6 DP 1128635, Razorback NSW

Description of Modified Grassland

Structure	Grassland dominated by exotic species
Overstorey	No overstorey is present
Mid-storey	No mid-storey is present
Groundcover	Groundcover includes the exotic species Kikuyu *Pennisetum clandestinum,* Clover *Trifolium repens,* Flatweed *Hypochaeris radicata* and Patterson's Curse *Echium plantagineum*
***Biometric* type**	Not applicable
***Biometric* formation**	Miscellaneous ecosystems: Highly disturbed areas with no or limited native vegetation
***Biometric* class**	Not applicable
Affiliated types	Not applicable
Condition	Not applicable
Conservation status	Not applicable

CMA regional cleared estimate	Not applicable
Representation in conservation reserves	Not applicable
Pre-1750 vegetation	Forest Red Gum - Grey Box shrubby woodland
Threatened Species	None
Comments	The building envelope and the majority of the subject site supports Modified Grassland dominated by exotic species. The Asset Protection Zone includes 1,500m^2 of Forest Red Gum - Grey Box shrubby woodland in low condition.

Description of Forest Red Gum - Grey Box shrubby woodland

Structure	Woodland with grassy groundcover.
Overstorey	The overstorey includes immature to semi-mature Narrow-leaved Ironbark *Eucalyptus crebra.*
Mid-storey	None
Groundcover	Groundcover includes the exotic species Kikuyu *Pennisetum clandestinum,* Clover *Trifolium repens,* Flatweed *Hypochaeris radicata* and Patterson's Curse *Echium plantagineum*
***Biometric* type**	Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin
***Biometric* formation**	Grassy Woodlands
***Biometric* class**	Coastal Valley Grassy Woodlands
Affiliated types	GW p514 Cumberland Moist Shale Woodland (Tozer et al. 2006)
Condition	*Moist Shale Woodland in the Sydney Basin Bioregion* is listed as Endangered under the NSW *Threatened Species Conservation Act 1995.* *Western Sydney Dry Rainforest and Moist Woodland on Shale* is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Conservation status	*Moist Shale Woodland in the Sydney Basin Bioregion* is listed as Endangered under the NSW *Threatened Species Conservation Act 1995.*

	Western Sydney Dry Rainforest and Moist Woodland on Shale is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
CMA regional cleared estimate	Forest Red Gum - Grey Box shrubby woodland is 75% cleared, and is therefore an over-cleared vegetation type.
Representation in conservation reserves	Less than 10ha of Forest Red Gum - Grey Box shrubby woodland is within conservation reserves (Tozer et al. 2006).
Pre-1750 vegetation	Forest Red Gum - Grey Box shrubby woodland.
Threatened Species	No threatened species were located.
Comments	Approximately 1,500m^2 of Forest Red Gum - Grey Box shrubby woodland in low condition will be disturbed for the establishment of the Asset Protection Zone.

8.4 Study area vegetation

Forest Red Gum - Grey Box shrubby woodland	As above
Modified Grassland	As above

8.5 Assessment of impacts on flora

Forest Red Gum - Grey Box shrubby woodland	Potential direct, indirect and cumulative impacts are recorded in Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW
Modified Grassland	

8.6 Discussion of flora impacts and issues

The impacts on flora are:
1. The clearing of Modified Grassland.
2. The clearing and disturbance of c.1,500m^2 of Forest Red Gum - Grey Box shrubby woodland in low condition for the establishment of the Asset Protection Zone.
Refer to Table 6: Assessment and management of impacts.

9. Fauna survey and assessment

9.1 Database search

Reference was made to the following databases:

Atlas of NSW Wildlife (TSC Act) (incorporating	The Atlas of NSW Wildlife was used to produce a list of Threatened Species (species, populations and communities) known or predicted to occur

Matters of National Environmental Significance (EPBC Act))	within a selected study area within the Cumberland subregion and further refined to match habitat types. The Atlas includes species, populations and communities listed under the NSW *Threatened Species Conservation Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Refer Table 3 and Figure 8.

9.2 Field survey

Survey methodology	The fauna survey was based upon the identification of potential habitats for birds, mammals, reptiles and amphibians and opportunistic sightings of fauna or evidence of the presence of fauna. Further fauna survey methods (e.g. trapping) were not considered necessary due to the location and extent of existing habitat, the nature of the development and the degree of impact to be imposed upon the habitat. Details of survey methods and effort are recorded in Table 7: Survey methodology and effort at Lot 6 DP 1128635, Razorback NSW.
Date/s of survey	13th October 2015 and 30th June 2015
Weather conditions	Weather was mild, and generally overcast with an occasional light sprinkling of rain. A light, easterly breeze present. The survey was undertaken between 2pm and 3pm.
Survey constraints	The timing and weather conditions may have limited the species of birds observed. To compensate for this constraint, results of a bird survey undertaken at the property on 30th June 2015 under more favourable conditions have been incorporated into this assessment.
Habitat mapping	Refer Figure 6: Habitat map at Lot 6 DP 1128635, Razorback NSW

9.3 Subject site habitats

Coastal Valley Grassy Woodlands	Refer Figure 6: Habitat map at Lot 6 DP 1128635, Razorback NSW and Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW
Highly disturbed areas with no or limited native vegetation	

9.4 Study area habitats

Coastal Valley Grassy Woodlands	Refer Figure 6: Habitat map at Lot 6 DP 1128635, Razorback NSW and Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW

Highly disturbed areas with no or limited native vegetation	

9.5 General habitat features

Wildlife corridors	The subject site and study area is located within a wildlife corridor of partially fragmented patches of remnant woodland within cleared grassland. Refer Figure 5.
SEPP 44 Koala habitat	The Wollondilly LGA is listed in Schedule 1 of *State Environmental Planning Policy No. 44 – Koala Habitat Protection*. *SEPP No. 44* requires that land in relation to which a development application has been made and which has an area of more than 1 hectare is subject to an assessment of whether it contains potential Koala habitat. Potential Koala habitat is an area of native vegetation where Koala feed tree species listed under Schedule 2 of SEPP No. 44 constitute at least 15% of the total number of trees in the upper and lower strata of the tree component. None of the Koala feed trees listed in Schedule 1 of SEPP no. 44 are present within the subject site. The subject is therefore not Core Koala Habitat.

9.6 Fauna observations

Fauna signs	No signs of fauna utilising the subject site were observed.
Fauna observed	Refer Table 2: Fauna observed at Lot 6 DP 1128635, Razorback NSW

9.7 Assessment of impacts on fauna

Coastal Valley Grassy Woodlands	Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW
Highly disturbed areas with no or limited native vegetation	

9.8 Discussion of fauna impacts and issues

The impacts on flora are:
1. The clearing of Highly disturbed areas with no or limited native vegetation habitat.
2. The clearing and disturbance of c.1,500m^2 of Coastal Valley Grassy Woodlands habitat in low condition for the establishment of the Asset Protection Zone.
Refer to Table 6: Assessment and management of impacts.

10. Management of impacts on flora and fauna

Avoiding impacts	Potential direct, indirect and cumulative impacts are recorded in Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW
Minimising impacts	
Mitigating impacts	

11. Assessments of Significance

Assessments have been prepared in accordance with *Threatened species assessment guidelines: The assessment of significance Department of Environment and Climate Change NSW* (2007). Assessments are recorded in Appendix 1.

Communities An Assessments of Significance has been prepared for the following community:

Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion

Flora Assessments of Significance have been prepared for the following species of flora:

No assessment required

Fauna Assessments of Significance have been prepared for the following species of fauna:

Anthochaera phrygia	Regent Honeyeater
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami	Glossy Black-Cockatoo
Cercartetus nanus	Eastern Pygmy-possum
Chalinolobus dwyeri	Large-eared Pied Bat
Chthonicola sagittata	Speckled Warbler
Circus assimilis	Spotted Harrier
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Daphoenositta chrysoptera	Varied Sittella
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Glossopsitta pusilla	Little Lorikeet
Grantiella picta	Painted Honeyeater
Hieraaetus morphnoides	Little Eagle
Lathamus discolour	Swift Parrot
Lophoictinia isura	Square-tailed Kite
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
Miniopterus australis	Little Bentwing-bat
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Myotis macropus	Southern Myotis
Neophema pulchella	Turquoise Parrot
Ninox connivens	Barking Owl
Ninox strenua	Powerful Owl
Petaurus australis	Yellow-bellied Glider
Petaurus norfolkensis	Squirrel Glider
Petroica boodang	Scarlet Robin

Petroica phoenicea	Flame Robin
Phascolarctos cinereus	Koala
Pteropus poliocephalus	Grey-headed Flying-fox
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat
Scoteanax rueppellii	Greater Broad-nosed Bat
Stagonopleura guttata	Diamond Firetail
Tyto novaehollandiae	Masked Owl
Tyto tenebricosa	Sooty Owl

12. Matters of National Environmental Significance (EPBC Act)

Western Sydney Dry Rainforest and Moist Woodland on Shale is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The proposed development will result in the clearing and disturbance of c.1,500m^2 of this vegetation in low condition. It is considered that a referral to the Minister is not required due to the minor nature of impacts.

13. Conclusion and recommendations

Conclusions

I. Samuel & Eleanor Cavanagh propose a five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. A previous report (Woodlands Environmental Management, 16th October 2015) assessed the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4.

II. This report assesses the potential impacts of a building envelope, associated Asset Protection Zone, access tracks and associated infrastructure on the proposed lot 3.

III. The vegetation to be cleared or disturbed is Modified Grassland dominated by exotic species classified as Highly disturbed areas with no or limited native vegetation, and Forest Red Gum - Grey Box shrubby woodland / Moist Shale Woodland in the Sydney Basin Bioregion

IV. Approximately 1,500m^2 of *Moist Shale Woodland in the Sydney Basin Bioregion* Endangered Ecological Community with a highly modified grassy groundcover dominated by exotic species and assessed to be in low condition will be disturbed or cleared to the establishment of an Asset Protection Zone.

V. No threatened species of flora was located within the subject site

VI. No threatened species of fauna was located by the survey, however the subject site supports habitat suitable for, and potentially utilised by thirty-five threatened species for foraging.

VII. The Assessment of Significance for Moist Shale Woodland in the Sydney Bioregion concludes that the activities undertaken in association with the proposed development are unlikely to have a significant impact on the Endangered Ecological Community but will make a minor contribution to the cumulative loss of Moist Shale Woodland Endangered Ecological Community, and a minor reduction in habitat for threatened species of fauna within the locality.

VIII. Assessments of Significance for thirty-five species of fauna conclude that the activities undertaken in association with the proposed development are unlikely to have a significant impact on the threatened species or their habitat.

Recommendations

I. It is recommended that clearing of trees be limited to meet the minimal requirements for the Asset Protection Zone.

14. References

DEC (2004) *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft),* New South Wales Office of Environment and Heritage, Hurstville, NSW.

Department of Environment, Climate Change and Water NSW (2011) *Operational Manual for BioMetric* 3.1. Department of Environment, Climate Change and Water, NSW Sydney.

Gellie, N.J.H. (2005) *Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes and SE Corner bioregions.* Cunninghamia 9(2): 219-254

Groves, R.L. (ed) (1981) *The Vegetation of Australia* Cambridge University Press, Cambridge.

Leeper, G.W. (ed) *The Australian Environment*, CSIRO, 1970

Mitchell, P.B. (2002) *NSW ecosystems study: background and methodology.* Unpublished report to NSW National Parks and Wildlife Service, Hurstville.

Mitchell, P.B. (2003) *NSW ecosystems database mapping unit descriptions*. Unpublished report to NSW National Parks and Wildlife Service, Hurstville

NSW National Parks & Wildlife Service (2000) *Forest Ecosystem Classification and Mapping for the Southern CRA Region: A report undertaken for the NSW CRA/RFA Steering Committee.*

NSW National Parks & Wildlife Service (2002) *Identification guidelines for Endangered Ecological Communities* NSW National Parks and Wildlife Service, Hurstville, NSW

NSW Department of Infrastructure, Planning and Natural Resources (2004b) *Draft Native Vegetation Regulation 2004: Environmental Outcomes Assessment Methodology* NSW Government

Thomas V., Gellie N., and Harrison T. (2000) *Forest ecosystem classification and mapping for the southern Comprehensive Regional Assessment.* NSW National Parks and Wildlife Service, Queanbeyan

Tindall, D., Pennay, C., Tozer, M., Turner, K. and Keith, D. (2004). *Native vegetation map report series No. 4. The Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale Penrith, Port Hacking, Sydney, Taralga, Ulladulla and Wollongong 1:100,000 map sheets. Draft Version 1.0.* NSW Department of Infrastructure, Planning and Natural Resources and NSW Department of Conservation

Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2006) *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands.* Version 1.0,

Figure 1: Location of subject site for Lot 6 DP 1128635, Razorback NSW

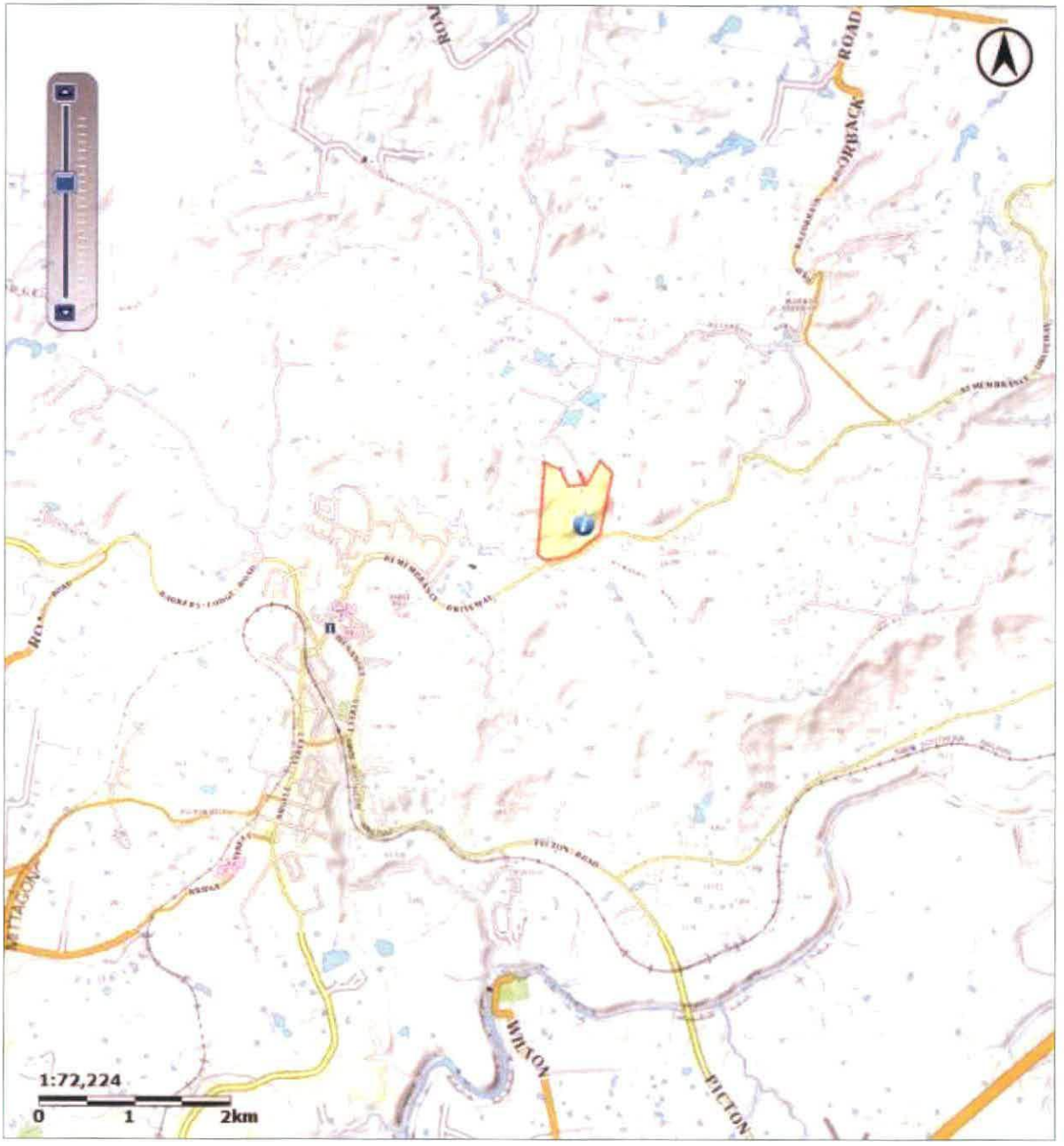


Figure 2: Proposed development plan at Lot 6 DP 1128635, Razorback NSW

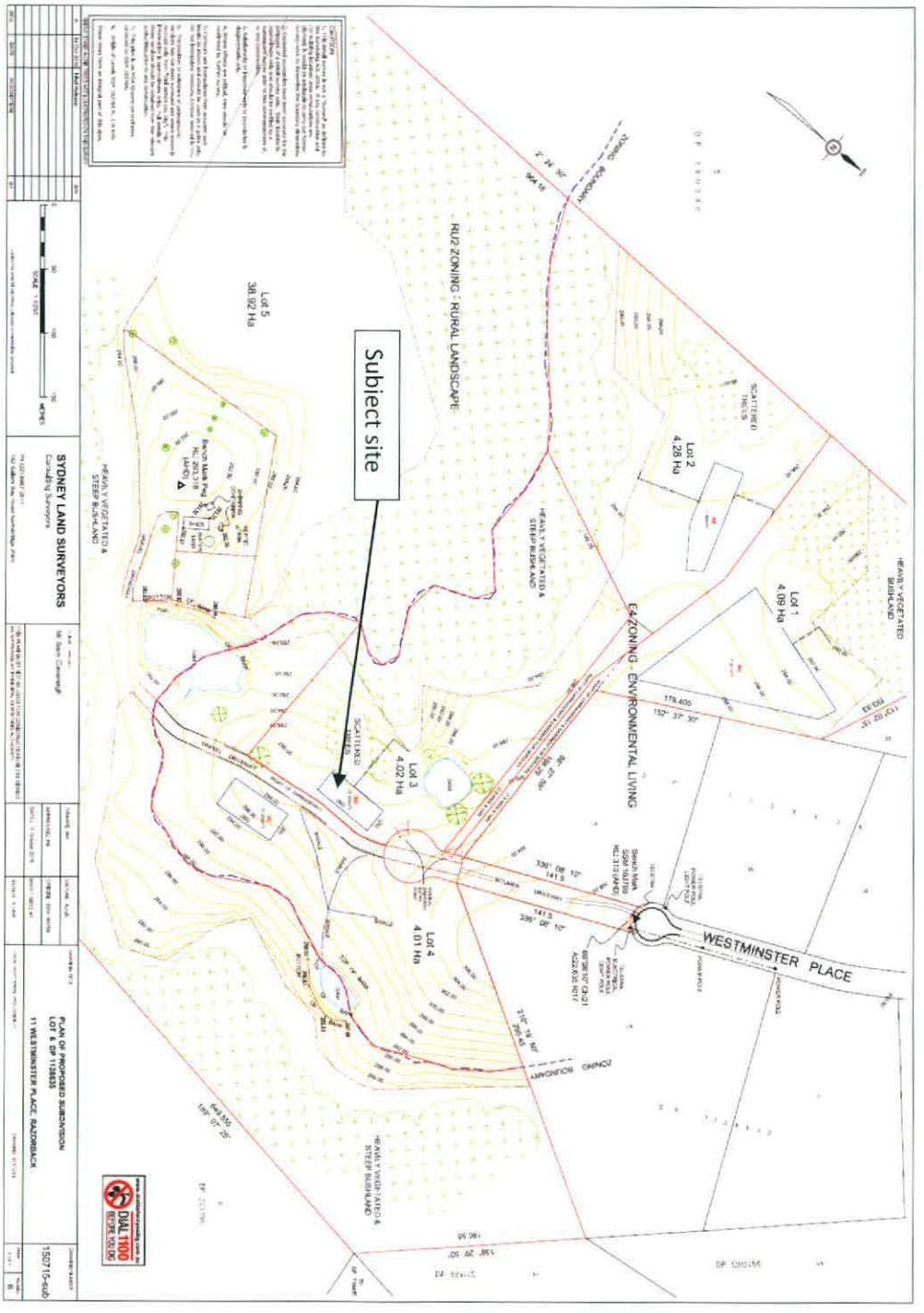
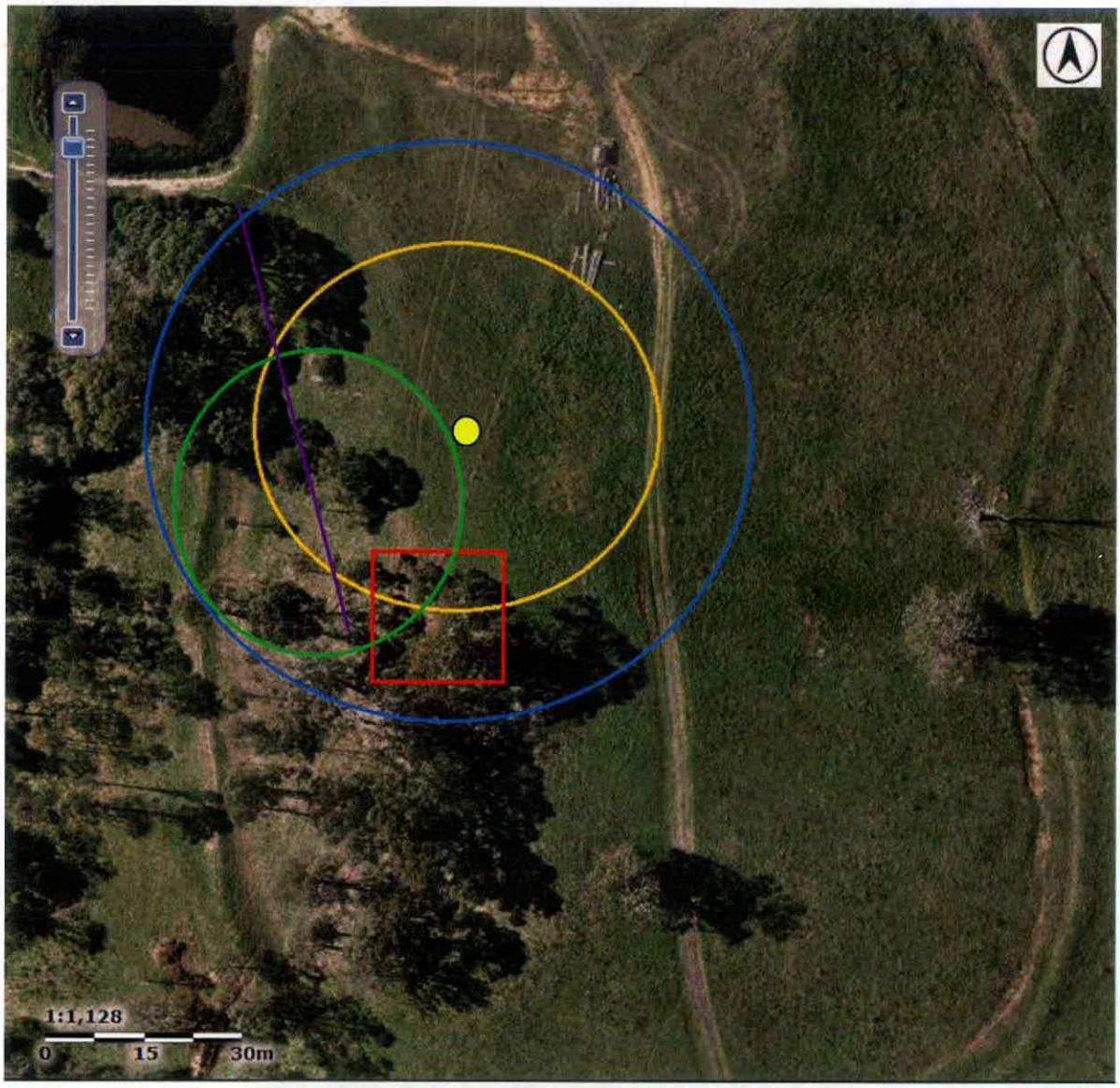


Figure 3: Subject site and study area at Lot 6 DP 1128635, Razorback NSW

Source: SIX Maps

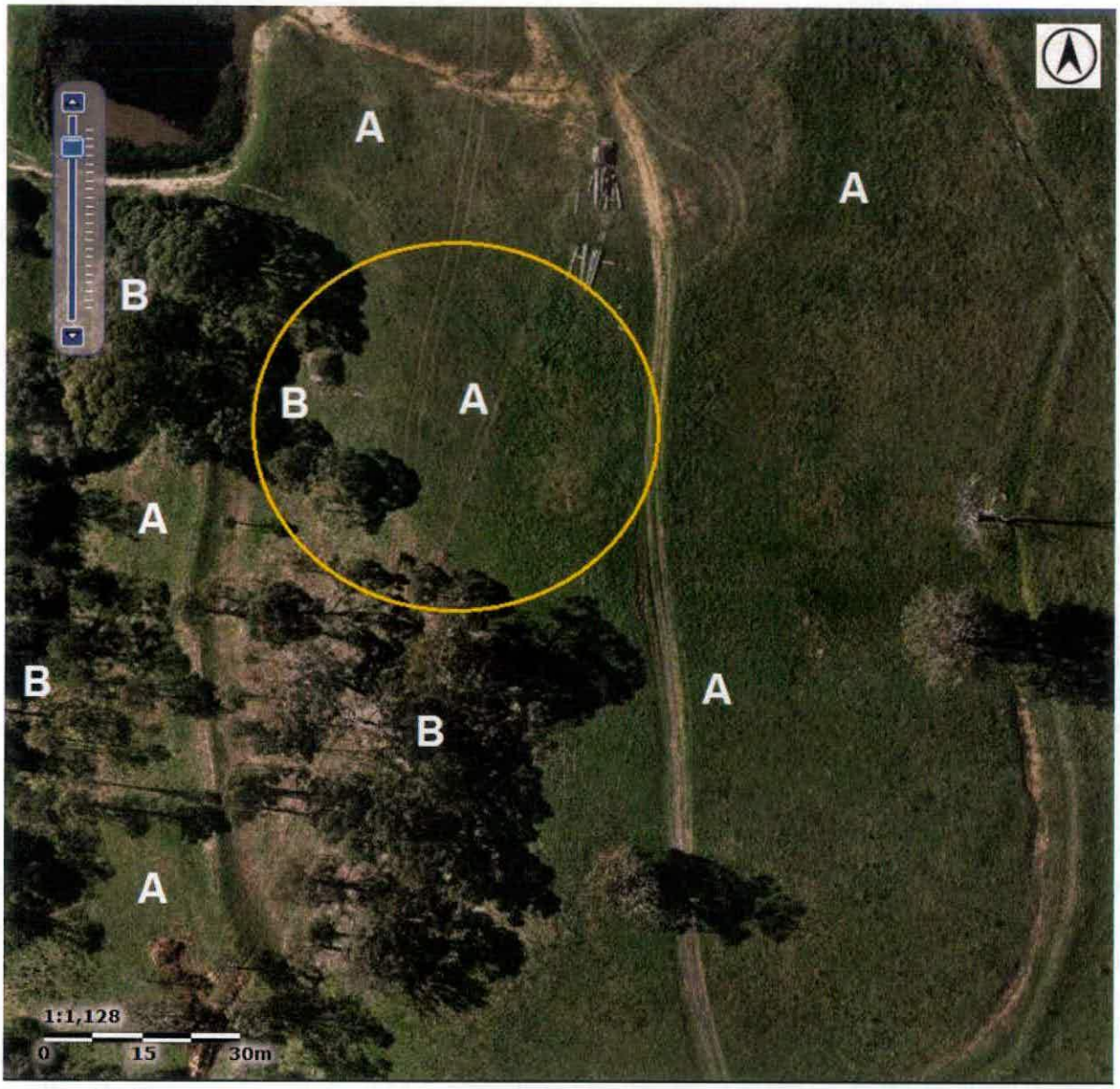
Figure 4: Survey map at Lot 6 DP 1128635, Razorback NSW



Source: SIX Maps

Red: 20m x 20m (400m^2) quadrat **Blue**: Bird census area **Purple**: 100m transect
Green: Random meanders, targeted searches and habitat searches

Figure 5: Vegetation map at Lot 6 DP 1128635, Razorback NSW

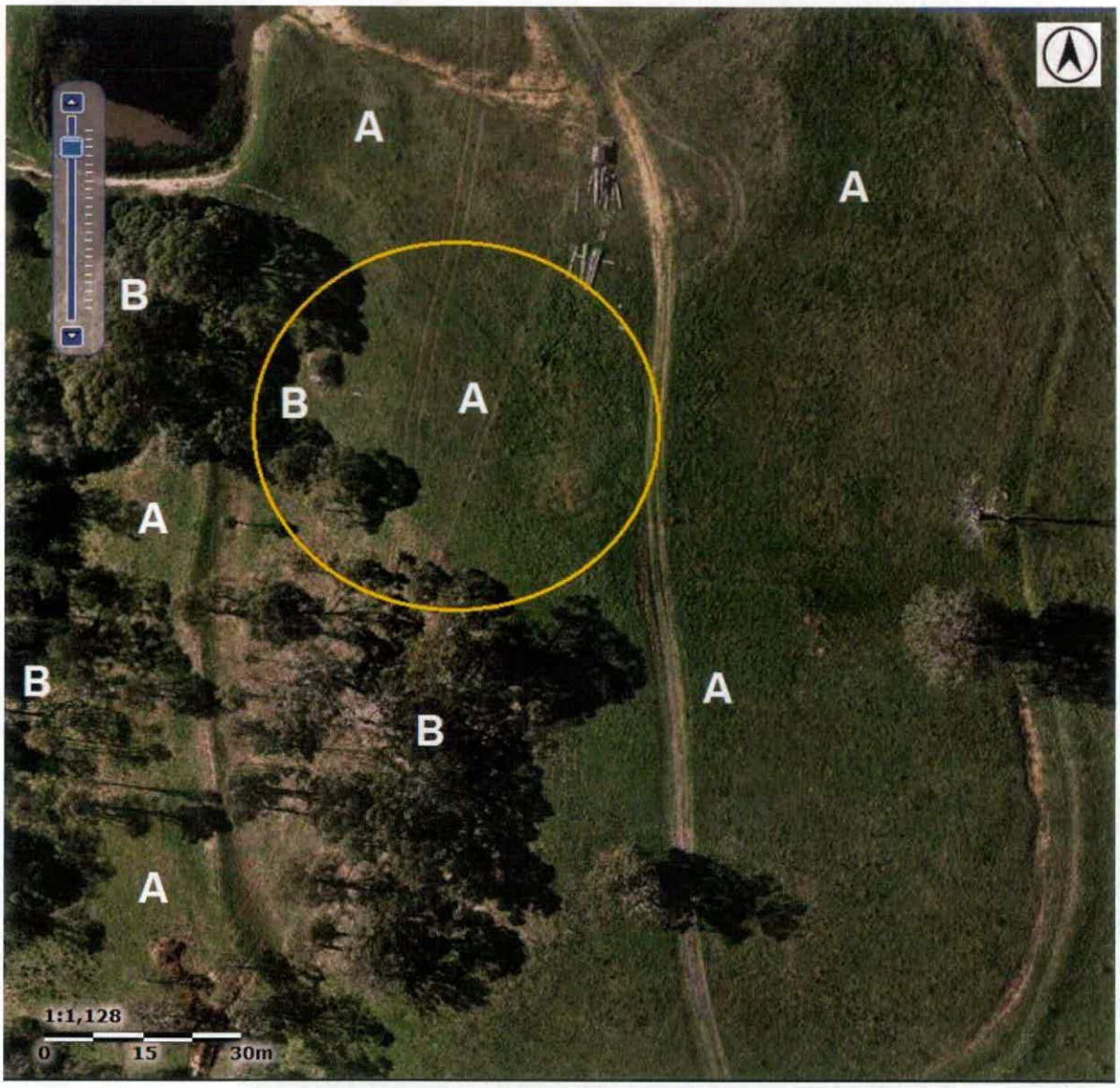


Source: SIX Maps

A - Modified Grassland

B - Forest Red Gum - Grey Box shrubby woodland / Moist Shale Woodland EEC

Figure 6: Habitat map at Lot 6 DP 1128635, Razorback NSW



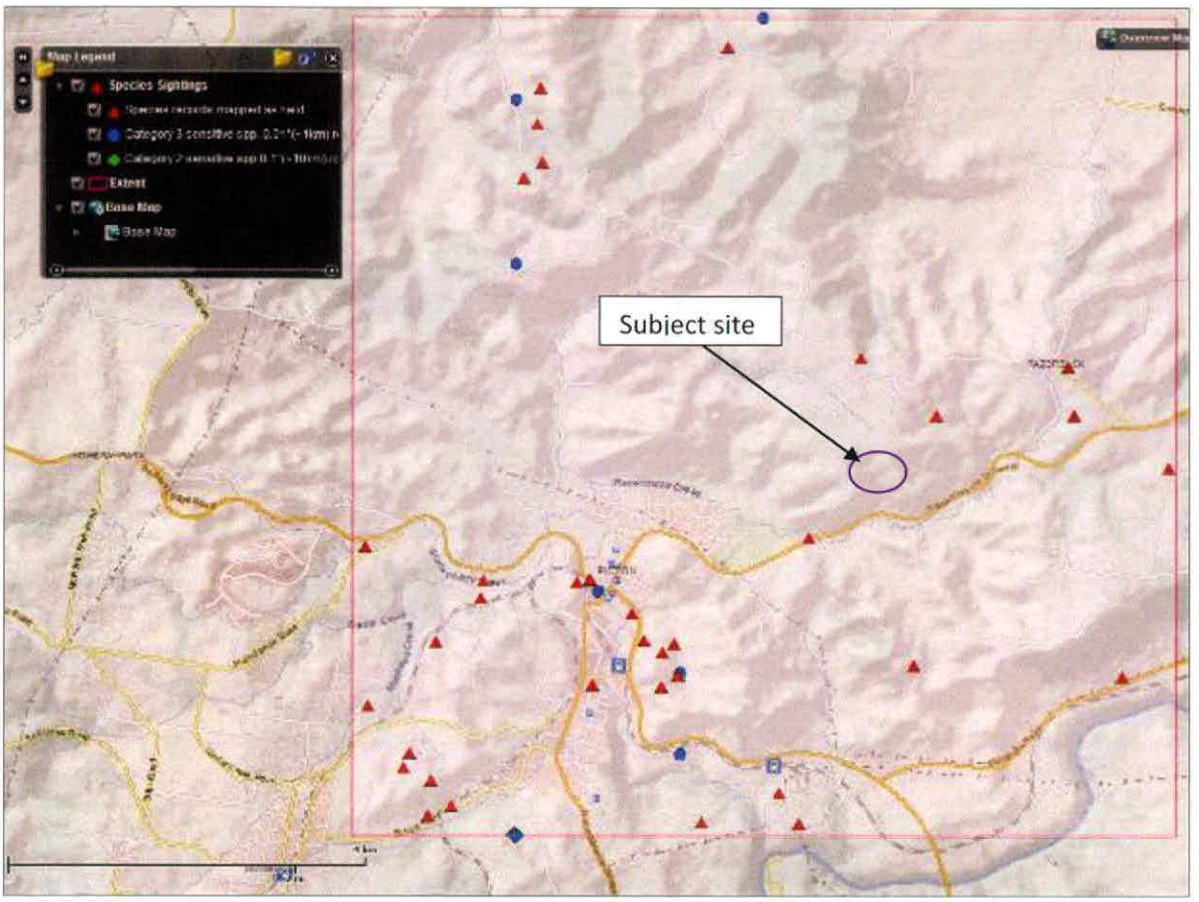
Source: SIX Maps

A - Highly disturbed areas with no or limited native vegetation
B - Coastal Valley Grassy Woodlands

Figure 7: Wildlife Corridors

Source: SIX Maps

Figure 8: Atlas of NSW Wildlife map



Source: Atlas of NSW Wildlife

Table 1: Flora species at Lot 6 DP 1128635, Razorback NSW

Scientific Name	**Common Name**	**A**	**B**		
**Arctotheca calendula*	Capeweed	●	●		
**Bidens pilosa*	Cobbler's Peg	●	●		
**Centella asiatica*	Pennywort	●	●		
**Cirsium vulgare*	Spear Thistle	●	●		
**Echium plantagineum*	Patterson's Curse	●	●		
**Festuca sp.*	Fescue	●	●		
**Hypochaeris radicata*	Flatweed	●	●		
**Lolium perenne*	Perennial Rye	●	●		
**Myosotis sp.*	Forget Me Not	●	●		
**Onopordum acanthium*	Scotch Thistle	●	●		
**Oxalis tuberosa*	Oxalis	●	●		
**Paspalum distichum*	Paspalum	●	●		
**Pennisetum clandestinum*	Kikuyu	●	●		
**Petrorhagia nanteuilii*	Proliferous Pink	●	●		
**Plantago lanceolata*	Ribwort Plantain	●	●		
**Senecio madagascariensis*	Fireweed	●	●		
**Taraxacum officinale*	Dandelion	●	●		
**Trifolium repens*	Clover	●	●		
**Trifolium sp.*	Clover	●	●		
**Verbena bonariensis*	Purpletop	●	●		
Eucalyptus crebra	Narrow-leaved Ironbark		●		
Rumex brownii	Swamp Dock	●	●		
A – Modified Grassland **B** – Forest Red Gum - Grey Box shrubby woodland					
Note: Presence only of species was recorded					

Table 2: Fauna observed at Lot 6 DP 1128635, Razorback NSW

Scientific Name	**Common Name**	**A**	**B**	
Zosterops lateralis	Silvereye		**O***	
Corcorax melanorhamphos	White-winged Chough		**O***	
Grallina cyanoleuca	Magpie-lark		**O***	
Rhipidura albiscapa	Grey Fantail		**O***	
Cracticus torquatus	Grey Butcherbird		**O***	
Philemon corniculatus	Noisy Friarbird		**O***	
Anthochaera carunculata	Red Wattlebird		**O* H**	
Cormobates leucophaea	White-throated Treecreeper		**O***	
Manorina melanocephala	Noisy Miner		**O* H**	
Platycercus eximius	Eastern Rosella	**o**	**O***	
Vanellus miles	Masked Lapwing	**O h**		
Wallabia bicolor	Swamp Wallaby	**o**		
A – Highly disturbed areas with no or limited native vegetation (subject site)				
B – Forest Red Gum - Grey Box shrubby woodland (study area)				
Subject site: o - observed **h** - heard call **s** - scats / signs **Study area: O** - observed **H** - heard call **S** - scats / signs * 30th June 2015				

Table 3: Threatened Species recorded in the Bionet Atlas of NSW Wildlife within 10km of Lot 6 DP 1128635, Razorback NSW

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -34.1 West: 150.57999999999998 East: 150.67999999999998 South: -34.2] returned a total of 57 records of 27 species.

Kingdom	Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		3
Animalia	Aves	Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V,P,3		1
Animalia	Aves	Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		4
Animalia	Aves	Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		3
Animalia	Aves	Psittacidae	*Lathamus discolor*	Swift Parrot	E1,P,3	E	1
Animalia	Aves	Strigidae	*Ninox connivens*	Barking Owl	V,P,3		1
Animalia	Aves	Strigidae	*Ninox strenua*	Powerful Owl	V,P,3		1
Animalia	Aves	Climacteridae	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		1
Animalia	Aves	Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V,P		2
Animalia	Aves	Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	E	3
Animalia	Aves	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1
Animalia	Aves	Petroicidae	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	V,P		1
Animalia	Aves	Petroicidae	*Petroica boodang*	Scarlet Robin	V,P		5

Animalia	Aves	Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V,P		1
Animalia	Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala	V,P	V	4
Animalia	Mammalia	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	1
Animalia	Mammalia	Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		1
Animalia	Mammalia	Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	3
Animalia	Mammalia	Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	V,P		1
Animalia	Mammalia	Vespertilionidae	*Myotis macropus*	Southern Myotis	V,P		1
Animalia	Gastropoda	Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		7
Plantae	Flora	Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E1,P	E	5
Plantae	Flora	Myrtaceae	*Eucalyptus macarthurii*	Paddys River Box, Camden Woollybutt	E1,P		1
Plantae	Flora	Polygonaceae	*Persicaria elatior*	Tall Knotweed	V,P	V	1
Plantae	Flora	Proteaceae	*Grevillea parviflora subsp. parviflora*	Small-flower Grevillea	V,P	V	1
Plantae	Flora	Proteaceae	*Persoonia bargoensis*	Bargo Geebung	E1,P	V	2
Plantae	Flora	Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E1,P	E	1

Commonwealth status

V – Vulnerable E – Endangered CE Critically Endangered EEC – Endangered Ecological Community EP – Endangered Population
K – Known to occur P – Predicted to occur

NSW Status

1 - Sensitivity Class 1 (Sensitive Species Data Policy)
2 - Sensitivity Class 2 (Sensitive Species Data Policy)
3 - Sensitivity Class 3 (Sensitive Species Data Policy)
E1 - Endangered (Threatened Species Conservation Act 1995)
E2 - Endangered Population (Threatened Species Conservation Act 1995)
E3 - Endangered Ecological Community (Threatened Species Conservation Act 1995)
E4A - Critically Endangered (Threatened Species Conservation Act 1995)
E4B - Critically Endangered Ecological Community (Threatened Species Conservation Act 1995)

P - Protected (National Parks & Wildlife Act 1974)
V - Vulnerable (Threatened Species Conservation Act 1995)
V2 - Vulnerable Ecological Community (Threatened Species Conservation Act 1995)

Table 4: Threatened Species associated with vegetation classes and habitats present at Lot 6 DP 1128635, Razorback NSW and recorded within Cumberland sub-region

Scientific Name	Common Name	NSW status	Comm. status	Status / Records	Present	Suitable veg. (1)	Suitable veg. (2)	Suitable veg. (3)	Suitable habitat	7-part test
Acacia bynoeana	Bynoe's Wattle	E	V	K			Yes			
Acacia pubescens	Downy Wattle	V	V	K			Yes			
Anthochaera phrygia	Regent Honeyeater	CE	E	K			Yes		Yes	Yes
Burhinus grallarius	Bush Stone-curlew	E		K			Yes			
Callocephalon fimbriatum	Gang-gang Cockatoo	V		K			Yes		Yes	Yes
Callocephalon fimbriatum - EP	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	EP		K						
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		K			Yes		Yes	Yes
Cercartetus nanus	Eastern Pygmy-possum	V		K			Yes		Yes	Yes
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	K			Yes		Yes	Yes
Chthonicola sagittata	Speckled Warbler	V		K			Yes		Yes	Yes
Circus assimilis	Spotted Harrier	V		K			Yes		Yes	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		K			Yes		Yes	Yes
Cumberland Plain Woodland in the Sydney Basin Bioregion	Cumberland Plain Woodland in the Sydney Basin Bioregion	CEEC	CE	K						
Cynanchum elegans	White-flowered Wax Plant	E	E	K			Yes			

Daphoenositta chrysoptera	Varied Sittella	V		K			Yes		Yes	Yes
Dasyurus maculatus	Spotted-tailed Quoll	V	E	K			Yes			
Dillwynia tenuifolia	Dillwynia tenuifolia	V		K			Yes			
Dillwynia tenuifolia - EP	Dillwynia tenuifolia, Kemps Creek	EP		K						
Eucalyptus benthamii	Camden White Gum	V	V	K			Yes			
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		K			Yes		Yes	Yes
Glossopsitta pusilla	Little Lorikeet	V		K			Yes		Yes	Yes
Grantiella picta	Painted Honeyeater	V		K			Yes		Yes	Yes
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	V		K			Yes			
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	CE	CE	P			Yes			
Hieraaetus morphnoides	Little Eagle	V		K			Yes		Yes	Yes
Hypsela sessiliflora	Hypsela sessiliflora	E	EX	K			Yes			
Ixobrychus flavicollis	Black Bittern	V		K			Yes			
Lathamus discolor	Swift Parrot	E	E	K			Yes		Yes	Yes
Litoria aurea	Green and Golden Bell Frog	E	V	K			Yes			
Lophoictinia isura	Square-tailed Kite	V		K			Yes		Yes	Yes
Marsdenia viridiflora subsp. viridiflora - EP	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP		K						
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		K			Yes		Yes	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		K			Yes		Yes	Yes
Meridolum corneovirens	Cumberland Plain Land Snail	E		K			Yes			
Miniopterus australis	Little Bentwing-bat	V		K			Yes		Yes	Yes
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V		K			Yes		Yes	Yes

Mormopterus norfolkensis	Eastern Freetail-bat	V		K			Yes		Yes	Yes
Myotis macropus	Southern Myotis	V		K			Yes		Yes	Yes
Neophema pulchella	Turquoise Parrot	V		K			Yes		Yes	Yes
Ninox connivens	Barking Owl	V		K			Yes		Yes	Yes
Ninox strenua	Powerful Owl	V		K			Yes		Yes	Yes
Pandion cristatus	Eastern Osprey	V		K			Yes			
Persicaria elatior	Tall Knotweed	V	V	K			Yes			
Persoonia bargoensis	Bargo Geebung	E	V	K			Yes			
Petaurus australis	Yellow-bellied Glider	V		K			Yes		Yes	Yes
Petaurus norfolcensis	Squirrel Glider	V		K			Yes		Yes	Yes
Petroica boodang	Scarlet Robin	V		K			Yes		Yes	Yes
Petroica phoenicea	Flame Robin	V		K			Yes		Yes	Yes
Phascolarctos cinereus	Koala	V	V	K			Yes		Yes	Yes
Pilularia novae-hollandiae	Austral Pillwort	E		K			Yes			
Pimelea curviflora var. curviflora	Pimelea curviflora var. curviflora	V	V	K			Yes			
Pimelea spicata	Spiked Rice-flower	E	E	K			Yes			
Pomaderris brunnea	Brown Pomaderris	E	V	K			Yes			
Pommerhelix duralensis	Dural Woodland Snail	NL	E	K			Yes			
Pseudophryne australis	Red-crowned Toadlet	V		K			Yes			
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	K			Yes		Yes	Yes
Pterostylis saxicola	Sydney Plains Greenhood	E	E	K			Yes			
Pultenaea parviflora	Pultenaea parviflora	E	V	K			Yes			
Pultenaea pedunculata	Matted Bush-pea	E		K			Yes			
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC		K						

Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		K			Yes		Yes	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	V		K			Yes		Yes	Yes
Stagonopleura guttata	Diamond Firetail	V		K			Yes		Yes	Yes
Thesium australe	Austral Toadflax	V	V	K			Yes			
Tyto novaehollandiae	Masked Owl	V		K			Yes		Yes	Yes
Tyto tenebricosa	Sooty Owl	V		K			Yes		Yes	Yes
Wahlenbergia multicaulis - EP	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	EP		P						
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	Western Sydney Dry Rainforest in the Sydney Basin Bioregion	EEC	CE	K			Yes			

V – Vulnerable E – Endangered CE Critically Endangered EEC – Endangered Ecological Community EP – Endangered Population
K – Known to occur P – Predicted to occur N – Nesting or breeding habitat F – Foraging habitat

Vegetation class 1: Coastal Valley Grassy Woodlands
Vegetation class 2: Highly disturbed areas with no or limited native vegetation

Table 5: Fauna habitats at Lot 6 DP 1128635, Razorback NSW

Terrestrial habitat features	**A**	**B**		
Trees with loose bark				
Fallen timber and logs				
Rock escarpments				
Rock ledges or overhangs				
Caves				
Rocky outcrops				
Flat sandstone rocks & crevices				
Termite mounds				
Mammal burrows				
Mistletoe		R		
Bursaria or spiky shrubs				
Allocasuarina spp.				
River, stream, creek or gully				
Swamp, pond, wetland, dam, permanent soaks or seepages				
Corridors for plant or animal species				
Scats				
Whitewashing				
Bark scratching				
Nests, dens etc.				
Artificial habitats for bats				
Tree hollows and stags				
2-5 cm diameter				
5-10 cm diameter				
10-15 cm diameter				
15-20 cm diameter				
>20 cm diameter				
Stags				
A – Highly disturbed areas with no or limited native vegetation				
B – Coastal Valley Grassy Woodlands				
F – frequent C – common O – occasional R – rare C/P – clumps/patches				

Riparian habitat features			
In stream features		**Bank habitat**	
Snags		Vegetation	
Boulders		Erosion	
Pools		Rocks etc.	
Riffles		Logs etc.	
Bends		Burrows	
In stream vegetation		Stock access	
Fringing			
Emergent			
Submerged			
Floating			
F – frequent C – common O – occasional R – rare C/P – clumps/patches			

Table 6: Assessment and management of impacts at Lot 6 DP 1128635, Razorback NSW

Action of activity	Nature and extent of potential impact	Recommendations for avoidance, minimisation, mitigation or offsetting of impact
Direct impacts		
Establishment of proposed building envelope on lot 3.	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Establishment of proposed Asset Protection Zones on lot 3.	Clearing or disturbance of approximately 1,500m^2 of Forest Red Gum - Grey Box shrubby woodland habitat in low condition	It is recommended that clearing of trees be limited to meet the minimal requirements for the APZ.
Indirect impacts		
Construction stage of the development	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Occupational stage of the development	Clearing or disturbance of approximately 1,500m^2 of Forest Red Gum - Grey Box shrubby woodland habitat in low condition	It is recommended that clearing of trees be limited to meet the minimal requirements for the APZ.
Cumulative impacts		
Direct and indirect impacts of the construction and occupational stages of the development.	Clearing or disturbance of Modified Grassland dominated by exotic species.	No recommendations for the avoidance, minimisation, mitigation or offsetting of impacts are required.
Direct and indirect impacts of the construction and occupational stages of the development.	Clearing or disturbance of approximately 1,500m^2 of Forest Red Gum - Grey Box shrubby woodland habitat in low condition	It is recommended that clearing of trees be limited to meet the minimal requirements for the APZ.

Table 7: Survey methodology and effort

	Method	Details	Date	Suggested minimum effort Draft Assessment Guidelines (2004)
Flora	1 x 400m^2 (1000m^2) Biometric quadrats	Floristics and structure	16th October 2015	1 x 400m^2 (1000m^2) quadrat per stratification unit <2 hectares, 3 plots for 5-20ha, 4 plots for 21-50ha, 5 plots for 51-100ha
	1 x random meanders / targeted searches	Search for Threatened Species	16th October 2015	30 minutes for each quadrat sampled within the same stratification unit as the quadrat
	1 x 100m transects	Additional floristics	16th October 2015	1x100m traverse per stratification unit <2 hectares, 3 transects for 5-20ha, 4 transects for 21-50ha, 5 transects for 51-100ha
Fauna	1 x 20 minute bird surveys	Record of sightings	16th October 2015	"A 1ha (200m x 500m) 20-minute search is the most common method" (p. 80)
	1 x survey of habitats	Search for tree hollows, stags, fallen timber, rock features, burrows, vegetation, termite mounds etc.	16th October 2015	Not specified. 30 minutes per stratification unit
	1 x survey for fauna signs	Search for scats, tracks scratchings, nests, burrows, tree scarring, white-washing etc.	16th October 2015	30 minutes searching each relevant habitat or stratification unit, including trees for scats, scratch marks, whitewashing etc.

Appendix 1: Assessments of Significance at Lot 6 DP 1128635, Razorback NSW

Introduction

Threatened species impact assessment is an integral part of environmental impact assessment. The objective of s. 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *assessment of significance*, is to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats through the planning and assessment process, and to ensure that the consideration is transparent.

Assessments have been prepared in accordance with *Threatened species assessment guidelines: The assessment of significance Department of Environment and Climate Change NSW* (2007).

This report therefore assesses the likely impacts of the proposed development on the following species:

Scientific Name	**Common Name**
Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion
Anthochaera phrygia	Regent Honeyeater
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami	Glossy Black-Cockatoo
Cercartetus nanus	Eastern Pygmy-possum
Chalinolobus dwyeri	Large-eared Pied Bat
Chthonicola sagittata	Speckled Warbler
Circus assimilis	Spotted Harrier
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Daphoenositta chrysoptera	Varied Sittella
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Glossopsitta pusilla	Little Lorikeet
Grantiella picta	Painted Honeyeater
Hieraaetus morphnoides	Little Eagle
Lathamus discolour	Swift Parrot
Lophoictinia isura	Square-tailed Kite
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
Miniopterus australis	Little Bentwing-bat
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Myotis macropus	Southern Myotis
Neophema pulchella	Turquoise Parrot
Ninox connivens	Barking Owl
Ninox strenua	Powerful Owl
Petaurus australis	Yellow-bellied Glider
Petaurus norfolkensis	Squirrel Glider
Petroica boodang	Scarlet Robin
Petroica phoenicea	Flame Robin
Phascolarctos cinereus	Koala
Pteropus poliocephalus	Grey-headed Flying-fox

Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat
Scoteanax rueppellii	Greater Broad-nosed Bat
Stagonopleura guttata	Diamond Firetail
Tyto novaehollandiae	Masked Owl
Tyto tenebricosa	Sooty Owl

Assessment for:

Moist Shale Woodland in the Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion

Description of the proposed development

Approximately 1,500m^2 of *Moist Shale Woodland in the Sydney Basin Bioregion* Endangered Ecological Community with a highly modified grassy groundcover dominated by exotic species and assessed to be in low condition will be disturbed or cleared to the establishment of an Asset Protection Zone.

Species or Community information

Distribution

Moist Shale Woodland usually occurs on soils derived from Wianamatta Shale on high country in the southern half of the Cumberland Plain, and occurs mainly in Wollondilly local government area. Also occurs in smaller amounts further north in the Camden, Campbelltown, Fairfield, Liverpool and Penrith local government areas. There are 604 ha remaining intact. A small remnant can be seen in Western Sydney Regional Park.

Habitat and ecology

- Mainly occurs in the hilly country with higher elevations where there is increased rainfall.
- Occurs on clay soils derived from Wianamatta shale and is intermediate between Cumberland Plain Woodland on drier sites and Western Sydney Dry Rainforest on wetter sites.
- Understorey shrubs in moist habitats are sensitive to fire and would be lost from the community with frequent fire.
- The shrubs and trees of Moist Shale Woodland provide excellent habitat for birds and insects, and provide ideal nesting hollows for mammals and birds.

Source: OEH Threatened Species profile
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10539

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

Comments

Individual species are assessed below.

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

Comments
No endangered population is present within the subject site or study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

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

Comments
Approximately 1,500m^2 of Moist Shale Woodland with a highly modified grassy groundcover dominated by exotic species and assessed to be in low condition will be disturbed or cleared. It is therefore considered that the action proposed i) is unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii) is unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

(d) in relation to the habitat of a threatened species, population or ecological community:

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

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

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

Comments
i) Approximately 1,500m^2 of Moist Shale Woodland habitat is likely to be removed or modified as a result of the action proposed.
ii) The area of habitat to be removed is located at the edge of a larger remnant and is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposed action.
iii) The area of habitat to be removed has been modified by clearing and grazing and therefore not considered important to the long-term survival of the species, population or ecological community in the locality.

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

Comments
No critical habitat is present within the subject site or study area.

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

Comments
A recovery plan has been prepared for Moist Shale Woodland i.e.
Department of Environment, Climate Change and Water (NSW) (2011) *Cumberland Plain Recovery Plan*, Department of Environment, Climate Change and Water (NSW), Sydney.

The recovery objectives of The Plan are:
1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands
2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner

The subject site is not located within the Priority Conservation Lands identified by The Plan.

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

Comments
The following actions to be undertaken are likely to result in the operation of the following Key Threatening Processes listed under Schedule 3 of the TSC Act (1995):
1. Clearing of native vegetation

Conclusion

The Assessment of Significance concludes that the activities undertaken in association with the proposed development are unlikely to have a significant impact on the community but will make a minor contribution to the cumulative loss of Moist Shale Woodland in the Sydney Bioregion within the locality.

Assessment for:

Anthochaera phrygia	*Regent Honeyeater*
Callocephalon fimbriatum	*Gang-gang Cockatoo*
Calyptorhynchus lathami	*Glossy Black-Cockatoo*
Cercartetus nanus	*Eastern Pygmy-possum*
Chalinolobus dwyeri	*Large-eared Pied Bat*
Chthonicola sagittata	*Speckled Warbler*
Circus assimilis	*Spotted Harrier*
Climacteris picumnus victoriae	*Brown Treecreeper (eastern subspecies)*
Daphoenositta chrysoptera	*Varied Sittella*
Falsistrellus tasmaniensis	*Eastern False Pipistrelle*
Glossopsitta pusilla	*Little Lorikeet*
Grantiella picta	*Painted Honeyeater*
Hieraaetus morphnoides	*Little Eagle*
Lathamus discolor	*Swift Parrot*
Lophoictinia isura	*Square-tailed Kite*
Melanodryas cucullata cucullata	*Hooded Robin (south-eastern form)*
Melithreptus gularis gularis	*Black-chinned Honeyeater (eastern subspecies)*
Miniopterus australis	*Little Bentwing-bat*
Miniopterus schreibersii oceanensis	*Eastern Bentwing-bat*
Mormopterus norfolkensis	*Eastern Freetail-bat*
Myotis macropus	*Southern Myotis*
Neophema pulchella	*Turquoise Parrot*
Ninox connivens	*Barking Owl*
Ninox strenua	*Powerful Owl*
Petaurus australis	*Yellow-bellied Glider*
Petaurus norfolcensis	*Squirrel Glider*
Petroica boodang	*Scarlet Robin*
Petroica phoenicea	*Flame Robin*
Phascolarctos cinereus	*Koala*
Pteropus poliocephalus	*Grey-headed Flying-fox*
Saccolaimus flaviventris	*Yellow-bellied Sheathtail-bat*
Scoteanax rueppellii	*Greater Broad-nosed Bat*
Stagonopleura guttata	*Diamond Firetail*
Tyto novaehollandiae	*Masked Owl*
Tyto tenebricosa	*Sooty Owl*

Description of the proposed development

Approximately 1,500m^2 of *Moist Shale Woodland in the Sydney Basin Bioregion* Endangered Ecological Community with a highly modified grassy groundcover dominated by exotic species and assessed to be in low condition will be disturbed or cleared to the establishment of an Asset Protection Zone. No mid-storey shrubs are present, and the trees to be removed are immature to semi-mature. There are no tree hollows or fallen timber to be removed.

Species or Community information

Regent Honeyeater *Anthochaera phrygia* inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She Oak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The

Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany but the bird also utilizes *E. microcarpa, E. punctata, E. polyanthemos, E. mollucana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea* and *Angophora floribunda*. Nectar and fruit from the mistletoes *A. miquelii, A. pendula, A. cambagei* are also eaten during the breeding season. A shrubby understorey is an important source of insects and nesting material. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and She oaks but also nest in mistletoe. An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female.

Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests.

Gang-Gang Cockatoo *Callocephalon fimbriatum* in summer, are generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum *Eucalyptus pauciflora* woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.

Gang-Gang Cockatoo *Callocephalon fimbriatum* is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.

Glossy Black Cockatoo *Calyptorhynchus lathami* inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of She Oak species, particularly Black She Oak *(Allocasuarina littoralis)*, Forest She Oak *(A. torulosa)* or Drooping She Oak *(A. verticillata)* occur. In the Riverina area, the Cockatoo inhabits open woodlands dominated by Belah *(Casuarina cristata)*. The species feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill and is dependent on large hollow-bearing eucalypts for nest sites.

Glossy Black Cockatoo *Calyptorhynchus lathami* is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia.

Eastern Pygmy-possum *Cercartetus nanus* is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas

woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. The possum feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum *(Pseudocheirus peregrinus)* dreys or thickets of vegetation. Nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares.

Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extents from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes.

Large-eared Pied Bat *Chalinolobus dwyeri* is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.

Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.This species probably forages for small, flying insects below the forest canopy.

Speckled Warbler *Chthonicola sagittata* lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.

Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast.

Spotted Harrier *Circus assimilis* occurs throughout the Australian mainland, except in densly forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.

Spotted Harrier occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. It builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Spotted Harrier preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.

Brown Treecreeper *Climacteris picumnus* is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Hollows in standing dead or live trees and tree stumps are essential for nesting.

Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The threatened eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. The western boundary of the eastern subspecies follows a line from Inverell - Gunnedah -Molong - Grenfell - Wagga Wagga - Albury.

Varied Sitella *Daphoenositta chrysoptera* are found in eucalypt woodlands and forests throughout their range. They prefer rough-barked trees like stringybarks and ironbarks or mature trees with hollows or dead branches. They feed mainly by gleaning on tree trunks or branches, moving downwards or along branches, searching for insects. They land at the top of a tree and work downwards, searching and poking into cracks and under things, chattering noisily.

The Varied Sitella's nest is a deep open cup, like a cone, of bark and spider web, decorated on the outside with long pieces of bark, camoflaged to look like the fork or branch where it is placed. This species usually breeds cooperatively, with the breeding pair having several helpers. They will sometimes also breed in single pairs. Only the breeding female incubates the eggs and broods the young. Varied Sitellas are endemic (only found in) and widespread in mainland Australia.

Eastern False Pipistrelle *Falsistrellus tasmaniensis* prefers moist habitats, with trees taller than 20 m. The species generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Eastern False Pipistrelle hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.

Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.

Little Lorikeet *Glossopsitta pusilla* forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards

Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.

Painted Honeyeater *Grantiella picta* inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or

eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.

The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution.

Little Eagle *Hieraaetus morphnoides* occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living rees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.

Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.

Swift Parrot *Lathamus discolor* migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.
Returns to home foraging sites on a cyclic basis depending on food availability.
Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *E. globulus*.

Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.

Square-tailed Kite *Lophoictinia isura* is found in a variety of timbered habitats including dry woodlands and open forests with a particular preference for timbered watercourses. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km2. Nest sites are generally located along or near watercourses, in a fork or on large horizontal limbs.

Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March.

Hooded Robin *Melanodryas cucullata cucullata* prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. The species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.

Hooded Robin is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form is found from Brisbane to Adelaide throughout much of inland NSW, with the exception of the north-west. The species is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania.

Black-chinned Honeyeater *Melithreptus gularis gularis* occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, including Yellow Box (*E. melliodora*) but also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. Feeding territories are large making the species locally nomadic. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage. The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage.

Black-chinned Honeyeater is widespread, from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond River district. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions.

Little Bentwing-bat *Miniopterus australis* prefers moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, *Melaleuca* swamps, dense coastal forests and banksia scrub and is generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.

Little Bentwing-bat is found within the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.

For Eastern Bentwing Bat *Miniopterus schreibersii oceanensis* caves are the primary roosting habitat, but the species also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Bentwing Bats form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young, but at other times populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. The bats hunt in forested areas, catching moths and other flying insects above the tree tops.

Eastern Bentwing Bat occurs along the east and north-west coasts of Australia.

Eastern Free-tail Bat *Mormopterus norfolkensis* occurs in dry sclerophyll forest and woodland east of the Great Dividing Range and roosts mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.

Eastern Free-tail Bat is found along the east coast from south Queensland to southern NSW.

Southern Myotis *Myotis macropus* generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense

foliage. The bats forage over streams and pools catching insects and small fish by raking their feet across the water surface.

Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.

Turquoise Parrot *Neophema pulchella* lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland and nests in tree hollows, logs or posts, from August to December. The species prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter.

The range of Turquoise Parrot extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range.

Barking Owl *Ninox connivens* inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large eucalypts. The owl feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Territories range from 30 to 200 hectares and birds are present all year. Nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*E. albens*), Red Box (*E. polyanthemos*) and Blakely's Red Gum (*E. blakelyi*).

Barking Owl is found throughout Australia except for the central arid regions and Tasmania. It is quite common in parts of northern Australia, but is generally considered uncommon in southern Australia. It has declined across much of its distribution across NSW and now occurs only sparsely. It is most frequently recorded on the western slopes and plains. It is rarely recorded in the far west or in coastal and escarpment forests.

Powerful Owl *Ninox strenua* inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. Pairs of Powerful Owls will defend a large home range of 400-1450 ha. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.

Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. Now uncommon throughout its range where it occurs at low densities.

Yellow-bellied Glider *Petaurus australis* occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. The Glider feeds primarily on plant and insect exudates,

including nectar, sap, honeydew and manna with pollen and insects providing protein. Sap is extracted by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Lives in a den, often in family groups, in hollows of large trees. Yellow-bellied Glider is very mobile and occupies large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.

Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.

Squirrel Glider *Petaurus norfolcensis* inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas, preferring mixed species stands with a shrub or Acacia midstorey. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.

Squirrel Glider is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria.

Scarlet Robin *Petroica boodang* lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands.

Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.

Flame Robin *Petroica phoenicea* breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes and prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.

Flame Robin is endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands.

Koala *Phascolarctos cinereus* inhabits eucalypt woodlands and forests and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Koalas are inactive for most of the day, feeding and moving mostly at night, spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.

Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts

with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands.

Grey-headed Flying-fox *Pteropus poliocephalus* occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps 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. Individual camps may have tens of thousands of animals and are used for mating, birth and the rearing of young. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some caps being used for over a century. Travel up to 50 km to forage. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops and can inflict severe crop damage.

Grey-headed Flying-fox is found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria.

Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* roosts singly or in groups of up to six, in tree hollows and buildings and in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. The bat forages in most habitats across its very wide range, with and without trees.

Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.

Greater Broad-nosed Bat *Scoteanax rueppellii* utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.

Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.

Diamond Firetail *Stagonopleura guttata* is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands, in open forest, mallee, Natural Temperate Grassland, in secondary grassland derived from other communities and often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. The species feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. The birds roost in dense shrubs or in smaller nests built especially for roosting.

Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia.

Masked Owl *Tyto novaehollandiae* lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

The range of Masked Owl extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution.

Sooty Owl *Tyto tenebricosa* occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*). Nests in very large tree-hollows.

Sooty Owl occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. There is no seasonal variation in its distribution.

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

Comments

If present the above birds, bats and mammals would be likely to utilize the habitat of the subject site for intermittent foraging only, as no nesting or breeding habitat is present. The action proposed is therefore unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Comments

No endangered population is present within the subject site or study area.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

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

Comments

Moist Shale Woodland in the Sydney Basin Bioregion Endangered Ecological Community is assessed above.

(d) in relation to the habitat of a threatened species, population or ecological community:
i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Comments

i) Approximately 1,500m^2 of Moist Shale Woodland habitat in low condition is likely to be removed or modified as a result of the action proposed. No tree hollows, fallen timber or mid-storey shrubs are present.
ii) The area of habitat to be removed is located at the edge of a larger remnant and is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposed action.
iii) The area of habitat to be removed has been modified by clearing and grazing and therefore not considered important to the long-term survival of the bird, bat and mammal species in the locality.

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

Comments

No critical habitat is present within the subject site or study area.

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

Comments

A recovery plan or threat abatement plan has been prepared for owls:

Department of Environment and Conservation (NSW) (2006). NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae) DEC, Sydney.

The Recovery Plan supports the protection of nest and roost sites, patches of habitat and prey bases within bushland residential subdivisions. No nest or roost sites were identified within the subject site, however the habitat could potentially be utilised by owls for foraging, breeding or nesting. The action proposed is therefore not inconsistent with the objectives or actions of the recovery plan.

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

Comments

The following actions to be undertaken are likely to result in the operation of the following Key Threatening Processes listed under Schedule 3 of the TSC Act (1995):
1. Clearing of native vegetation

Conclusion

The Assessment of Significance concludes that the activities undertaken in association with the proposed development are unlikely to have a significant impact on the habitat for threatened species of birds, bats and mammals, but will make a minor contribution to the cumulative loss of Moist Shale Woodland in the Sydney Bioregion, and a minor reduction in habitat for threatened species of fauna within the locality.

References

NSW NPWS (2003) *Saving out threatened native animals and plants: Recovery and threat abatement in action - 2003 update* NSW National Parks and Wildlife Service, Hurstville,

Appendix 2: Vegetation condition

Vegetation condition benchmarks are described for a suite of condition variables by vegetation type at the scale of the stand or patch. Benchmarks are used in *BioMetric* as yardsticks against which to assess the current condition of native vegetation. Each condition variable is allocated a score from 0-3 (0=low, 1=moderate, 2=high, 3=very high) based on the difference between its measured value and its benchmark. This scoring system is explained in the *BioMetric* Operational Manual (Version 3.1 - updated February 2011) (PDF - 6.0 MB).

The method of data collection is as described in Appendix 3 of Department of Environment, Climate Change and Water NSW (2011) *Operational Manual for BioMetric* 3.1. Department of Environment, Climate Change and Water, NSW Sydney.

Vegetation community	Native plant species richness	Native overstorey cover %	Native mid-storey cover %	Native ground-cover (grasses) %	Native ground-cover (shrubs) %	Native ground-cover (other) %	Lack of exotic plant cover (calculated as % of total ground and mid-storey cover)	Number of trees with hollows	Proportion of over-storey species occurring as regeneration	Total length of fallen logs	Score / Condition
Forest Red Gum - Grey Box shrubby woodland benchmark	**28**	**11.75-24.25**	**22.1-48.1**	**11.92-21.32**	**0-5**	**5-14.4**		**1**		**5**	
Data	2	10	0	0	0	1	1	0	0	0	
Score	0	2	0	0	0	0	0	0	0	0	2
Modified Grassland benchmark	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Data											
Score											

Appendix 3: Photographs at Lot 6 DP 1128635, Razorback NSW

Photo 1: Looking north on Lot 3. Modified Grassland and remnant Forest Red Gum - Grey Box shrubby woodland.

Photo 2: Looking south- west from building envelope. Remnant Forest Red Gum - Grey Box shrubby woodland to be partially cleared for APZ.

Photo 3: Looking north on Lot 3. Modified Grassland and remnant Forest Red Gum - Grey Box shrubby woodland.

Photo 4: Looking west from building envelope on Lot 3. Modified Grassland and remnant Forest Red Gum - Grey Box shrubby woodland.

Photo 5: Looking south across building envelope of Lot 3. Modified Grassland.

Appendix 4: Certification

Woodlands
Environmental Management
Forest Road, Wingello, NSW, 2579
Tel. (02) 488 44255 Mobile 0422279946
E-mail: woodlandsenviro@gmail.com

ABN 93036995658

Report title:	Environmental assessment (flora and fauna) for a proposed development at Lot 6 DP 1128635, Razorback NSW
Report prepared by:	Greg Stone, Woodlands Environmental Management
Qualifications:	BAppSc (Parks, Recreation & Heritage), GradCert (Science Communication), AdvDip (Land Management), AssDip (Land Management)
Address:	Woodlands Environmental Management 133 Forest Road, Wingello, NSW 2579
Applicant Name:	Samuel & Eleanor Cavanagh
Applicant Address:	152 Sailors Bay Road Northbridge NSW 2063
Land to be developed:	Lot 6 DP 1128635, Razorback NSW
Proposed development:	A five lot residential subdivision. Approval has been previously granted for a dwelling on the proposed lot 5. A previous report (Woodlands Environmental Management, 16th October 2015) assessed the potential impacts of building envelopes, Asset Protection Zones, access tracks and associated infrastructure on the proposed lots 1, 2 and 4. As an annexure, this report assesses impacts on the proposed lot 3.
Certification:	I certify that I have prepared the contents of this report and to the best of my knowledge: • It reports on the potential impacts of the proposal as generally outlined in the concept application; • It is true in all material particulars and does not, by its presentation or omission of information, materially mislead. •
Disclaimer:	This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person including the client then Woodlands Environmental Management advises that the advice should not be relied

upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be interpreted without reference to the entire report.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

Signature:

Name: Gregory John Stone
Date: 22nd October 2015

Appendix 5: Curriculum Vitae, licensing and insurance

Curriculum Vitae

Name
Gregory John Stone

Contact details
Address: 133 Forest Road
Wingello NSW 2579

Email: woodlandsenviro@gmail.com

Telephone: (02) 48844255
Mobile: 0422279946

Qualifications and education
Bachelor of Applied Science (Parks, Recreation and Heritage)
Charles Sturt University

Graduate Certificate in Science Communication
Australian National University

Master of Environmental Management (candidate)
Charles Sturt University

Advanced Diploma in Land Management
University of Sydney

Associate Diploma in Land Management
University of New England

Name of the organization: **Woodlands Environmental Management**
Designation: Principal environmental consultant (self-employed)
Period: 1990 to present
Duties:

- Preparation of environmental assessments undertaken for development applications, rehabilitation projects and conservation agreements

- Preparation of environmental assessments undertaken in accordance with *Native Vegetation Act 2003, Threatened Species Conservation Act 1995, Threatened Species Conservation Amendment Act 2002,* the *Environmental Planning and Assessment Act 1979* and the *Commonwealth Environment Protection and Biodiversity Act 1999*

- Preparation of Assessments of Significance (Seven Part Tests) for Threatened Species and Endangered Ecological Communities.

- Preparation of Habitat Management Plans for the purpose of protecting Threatened Species of flora, fauna and Endangered Ecological Communities and their habitats.

- Vegetation surveying and mapping undertaken within conservation areas and bushland reserves on the Southern Tablelands

- Preparation and monitoring of Vegetation Management Plans.

- Preparation of management plans for natural areas incorporating fire, weed and water management and rehabilitation work.

- Delivery of lectures, training, workshops and field days conducted for NSW National Parks and Wildlife Service, Hawkesbury - Nepean Catchment Management Authority, Wingecarribee Shire Council, Department of Agriculture, Landcare NSW, Bushcare, TAFE NSW, Department Infrastructure, Planning and Natural Resources and community groups

Contracts with NSW Government

Name of the organization: **Hawkesbury-Nepean Catchment Management Authority**
Designation: Catchment Officer (part-time)
Period: August 2007 to August 2012
Duties: Administering the *Native Vegetation Act 2003,* undertaking assessments for Property Vegetation Plans.
Co-ordination of Southern Highlands and Tablelands Biolinks project including incentive, community education and conservation programs.

Name of the organization: **NSW Office of Environment and Heritage**
Designation: Conservation Partners Program contractor
Period: 2008 to present
Duties: Preparing Conservation Agreements with private landholders on properties of high conservation value across south-east NSW.

Insurances

Public and Products Liability Insurance
AIG Australia Limited
Policy No: 9621775CMB Expiry Date: 29/10/2015
Limit of Liability: $10,000,000

Professional Indemnity
CGU Insurance Limited
Policy No: 61MIS7141238 Expiry Date: 30/10/2015
Limit of Liability: $10,000,000

Licence

Greg Stone of Woodlands Environmental Management currently holds a **SCIENTIFIC LICENCE** issued under the *National Parks & Wildlife Act 1974*

Licence number is: **SL101033**

Class Name: **Biodiversity assesment/Species Impact Statement**
Ecological survey/consultancy