ESCARPMENT FLORA AND FAUNA REVIEW

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1.0 INTRODUCTION

Penrith Lakes Development Corporation (PLDC) has prepared a Preliminary Site Flora and fauna Assessment of the Escarpment which is a portion of land within the PLDC Scheme Area located between Church Lane and Castlereagh Road in Castlereagh, NSW (see Figure 1).

The Escarpment is 9.4 hectares in size and has road frontage to Church Lane. It consists of native vegetation with open grasslands and areas of intact canopy and understorey. It is proposed that the end land use for the escarpment area will be Rural Residential. The land will have conservation covenants in place which will allow for building and rural uses on the open grasslands but will protect and maintain the areas containing protected species e.g. *Grevillea juniperina* or Endangered Ecological Communities e.g. Cumberland Plains Woodland

The aim of this document is to:

- Provide an assessment of the habitat available to flora and fauna at the Escarpment,
- Outline any legislative limitations for the site,
- Outline opportunities and constraints for the site, and
- Assist in the dedication process.

2.0 LEGISLATION

2.1 LOCAL GOVERNMENT

A Tree Preservation Order (TPO) applies to the whole of the Penrith Local Government Area to ensure the long-term survival of the landscape character of the area. It promotes the replanting and good management of trees, whilst prohibiting the ring-barking, cutting down, topping, lopping, removing, injuring or willful destruction of any trees having a height greater than 3m with a girth of 30cm measured 40cm above the ground except with the written consent of Council.

The Tree Preservation order applies to all trees on private property contact Councils Parks Department for issues relating to street trees and trees on public property.

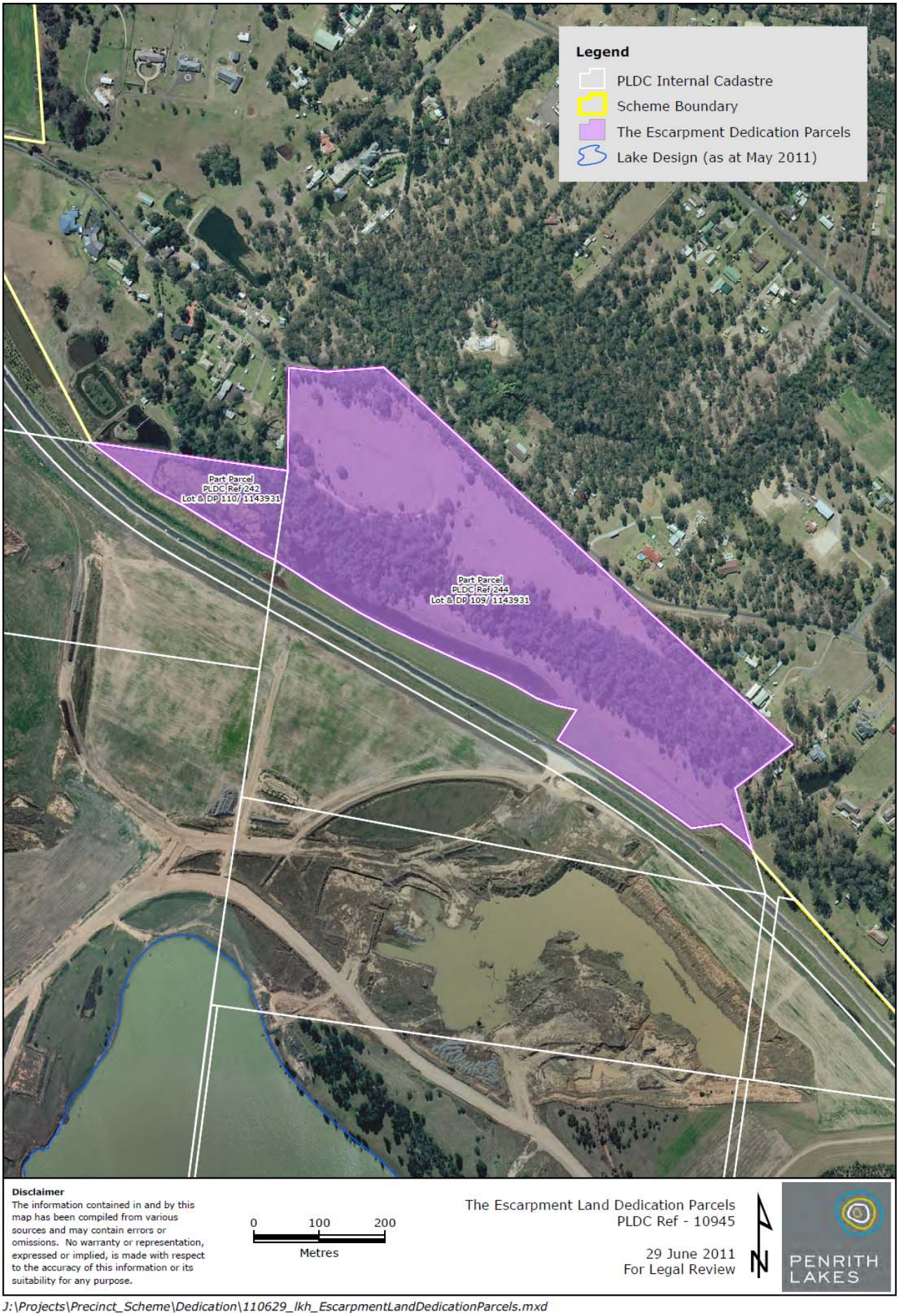

Figure 1: The Escarpment area and its components.

2.2 STATE GOVERNMENT

The Threatened Species Conservation Act 1995 (TSC Act) commenced on 1 January 1996 and replaced the Endangered Fauna (Interim Protection) Act 1991. OEH is responsible for administering the TSC Act, which aims to protect species, populations and ecological communities threatened with extinction in NSW. The NSW Department of Industry is responsible for protecting threatened fish and marine vegetation.

The main objectives of the TSC Act are to

- conserve biological diversity and promote sustainable development
- prevent the extinction of native plants and animals
- protect habitat that is critical to the survival of endangered species
- eliminate or manage threats to biodiversity
- properly assess the impact of development on threatened species
- encourage cooperative management in the conservation of threatened species

2.3 COMMONWEALTH GOVERNMENT

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) commenced on 16 July 2000 and replaced the Environment Protection (Impact of Proposals) Act 1974, the Endangered Species Protection Act 1992, the National Parks and Wildlife Conservation Act 1975, World Heritage Properties Conservation Act 1983 and the Whale Protection Act 1980.

The Act enables the Commonwealth to join with the States (including Territories) in providing a truly national scheme of environmental protection and biodiversity conservation, recognising our responsibility to not only this generation, but also future generations. It does so by providing for Commonwealth leadership on the environment, while also recognising and respecting the responsibility of the States for delivering on-ground natural resource management.

3.0 EXISTING FLORA AND FAUNA

The Escarpment is 9.4 hectares in size which lies on the top of the Castlereagh Escarpment on the eastern edge of the PLS. It contains native vegetation with an intact canopy and understorey. The surrounding landscape on the eastern side of the Nepean River is heavily fragmented. Approximately 600 metres to the south east another area of native vegetation, Vincent Creek, which is owned and managed by the PLDC, can be found. Between these two areas, vegetation of a similar vegetation community can be found which is privately owned and managed.

The vegetation of the escarpment consists of fragments of alluvial woodland following the drainage lines at the bottom of the Escarpment transitioning into Cumberland Plains Woodland, an area of open grassland and a strip of Cumberland Plain Woodland following Church Lane.

Many native species are scattered throughout the site, including *Grevillea juniperina* spp. *juniperina* which is listed as a vulnerable species on Schedule 2 of the *Threatened Species Conservation Act* 1995 (NSW).

G. juniperina subsp. *juniperina* is a broadly spreading to erect shrub mostly 0.5 to 2.5m high (occasionally to 3m high) and to 3m wide. The leaves are prickly, narrow, often bright green, to 22mm long and clustered along short lateral branches. Flowers are “spiderlike”, 2.5-3.5cm long and may be red to pinkish, yellow, pale orange or greenish. The fruiting capsule is 10-18mm long with one or two seeds.

Most populations are found in disturbed sites, particularly along roadsides, reflecting high levels of urbanisation in the region and a tendency for the species to colonise such areas. In disturbed sites populations are often quite large (250- >1000 plants) and comprise a high proportion of seedlings

and immature plants. Under more stable conditions plants appear to have a more scattered distribution and populations have a higher proportion of larger, mature plants. Populations are mostly between 40 and 300 plants.

Sydney Coastal River Flat Forest is listed as an endangered ecological community under the *Threatened Species Conservation Act* 1995.

Cumberland Plain Woodland is listed as an endangered ecological community under the *NSW Threatened Species Conservation Act* 1995 and the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999.

A large open grassland area at the top of the escarpment contains large quantities of native grasses, in particular Dichelachne.

Table 1 Native flora species of the Escarpment

SCIENTIFIC NAME	COMMON NAME
Trees	
Allocasuarina littoralis	Black Oak
Angophora subvelutina	Broad Leaf Apple
Brachychiton populneus	Kurrajong
Casuarina cunninghamiana	River Oak
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus crebra	Narrow Leaf Ironbark
Eucalyptus euginoides	Thin Leaved Stringybark
Eucalyptus tereticornis	Forest Red Gum
Melia azedarach	White Ceadr
Rapanea variabilis	Mutonwood
Syncarpia glomulifera	Turpentine
Shrubs	
Acacia binervia	Coastal Myall
Acacia decurrens	Golden Wattle
Acacia fimbriata	Fringed Wattle
Acacia floribunda	Sally Wattle
Acacia implexa	Hickory
Acacia parramattensis	Sydney Green Wattle
Breynia oblongifolia	Coffee Bush
Bursaria spinosa	Blackthorn
Clerodendrum tomentose	Hairy Clerodendrum
Daviesia ulicifolia	Gorse Butter Pea
Dillwynia sieberi	Egg and Bacon
Exocarpus cupressiformis	Cherry Ballart
Grevillea juniperina	Juniper Leaved Grevillea
Hakea sericea	Needle Bush
Jacksonia scopara	Dogwood
Notalea longifolia	Mock Olive
Ozothamnus diosmifolius	Pill Flower
Persoonia linearis	Geebung
Trema aspera	Poison Peach
Ground stratum	
Aristida ramosa	Three Awn Speargrass
Aristida vagans	Three Awn Speargrass
Asperula conferta	Common Woodruff
Bothriochloa decipiens	Pitted Bluegrass
Bothriochloa macra	Red Grass
Brunoniela australis	Australian Bugal
Caesia parviflora	Pale Grass Lily
Centella asiatica	Pennywort

Chloris ventricosa	Windmill grasas
Commelina cyanea	Creeping Christian
Crassula sieberana	Sieber's Crassula
Cymbopogon refractus	Barbed Wire Grass
Cynodon dactylon	Cooch
Cyperus gracilis	Slender Flat Sedge
Danthonia racemosa	Wallaby Grass
Dianella longifolia	Flax Lily
Dichelachne micrantha	Plume Grass
Dichondra repens	Kidney weed
Echinopogon caespitosis	Hedgehog Grass
Echinopogon ovatus	Hedgehog Grass
Einadia polygonoides	Knotted goosefoot
Einadia trigonis	Fishweed
Entolasia marginata	Bordered Panic Grass
Eragrostis leptostachya	Paddock Lovegrass
Goodenia hederaceae	Forrest Goodenia
Hibbertia diffusa	Wedge Guinea Flower
Imperata cylindrical	Bladey grass
Hypericum gramineum	Small St Johns Wort
Laxmannia gracilis	Slender Wire Lily
Lepidosperma laterale	Variable Saw Sedge
Lomandra filiformis var coriacea	Wattle Matt Rush
Lomandra filiformis var filiformis	Wattle Matt Rush
Lomandra glauca	Pale Matt Rush
Lomandra longifolia	Matt Rush
Lomandra multiflora	Many Flowered Matt Rush
Microlaena stipoides	Weeping Meadow Grass
Opercularia diphylla	
Oxalis perenans	Grassland Wood Sorrel
Panicum simile	Two Colour panic
Paspalidium criniforme	
Paspalidium distans	
Phyllanthus virgatus	
Pratia purpurescens	White Root
Sigesbeckia orientalis	Indian Weed
Solanum prinophyllum	Forest Nightshade
Themeda australis	Kangaroo Grass
Vernonia cineria	Common Vernonia
Wahlenbergia gracilis	Bluebell
Ferns	
Adiantum hispidulum	Rough Maidenhair fern
Asplenium flabellifolium	Necklace Fern
Cheilanthes sieberi	Mulga Fern
Climbers	
Cassytha glabella	Dodder
Glycine microphylla	Small Leaf Glycine
Glycine tabacina	Variable Glycine
Desmodium varians	Slender Tick Trefoil
Parsonsia straminea	Silky Pod
Rubus parviflorus	Native Raspberry
Veronica calycina	Hairy Speedwell

Thirty four environmental weed species have been recorded from the site; these are identified in Table 2. Seven of these species are declared weeds under the NSW Noxious Weeds Act 1993.

Table 2 Exotic flora species of the Escarpment

SCIENTIFIC NAME	COMMON NAME	NOXIOUS WEED CATEGORY
Amaranthus sp	Amaranth	
Anagallis arvensis	Blue Pimpernel	
Araujia hortorum	Moth Vine	
Bidens pilosa	Cobblers Pegs	
Bryophyllum spp	Mother of Millions	3
Cerastium fontanum	Mouse Eared Chickweed	
Cestrum parqui	Green Cestrum	3
Chloris gayana	Rhodes Grass	
Cirsium vulgare	Spear Thistle	
Cinnamomum camphora	Camphor Laurel	
Conyza bonariensis	Fleabane	
Eragrostis curvula	African Lovegrass	
Gleditsia triacanthos	Honey Locust	
Lantana camara	Lantana	5
Ligustrum lucidum	Large Leaf Privet	4
Lycium ferocissimum	African Box Thorn	4
Morus nigra	Mulberry	
Opuntia sp	Prickly Pear	4
Paspalum dilatatum	Paspalum	
Pavonia hastate	Pavonia	
Pennisetum clandestinum	Kikuyu	
Phytolacca octandra	Inkweed	
Rubus fruticosus	Blackberry	4
Setaria sp	Pigeon Grass	
Sida rhombifolia	Paddy's Lucerne	
Solanum mauritianum	Wild Tobacco Tree	
Solanum nigrum	Nightshade	
Solanum pseudocapsicum	Jerusalem Cherry	
Sonchus Oleraceus	Sow Thistle	
Sporobolus sp	Rats Tail Grass	
Tagetes minuta	Stinking Roger	
Tradescantia albifolia	Wandering Jew	
Trifolium repens	White Clover	
Verbena bonariensis	Purple Tops	

Forty one threatened fauna species listed on the TSC and/or EPBC Acts have either been recorded within 10 km of the study area or have potential habitat within 10 km of the Lakes Scheme.

Fauna habitat along Escarpment is provided in the form of large hollow bearing trees, areas of dense vegetation, logs, rocks and other debris on the ground and through the varied topography (gullies). The condition of the understorey and ground habitat along the areas provides value for ground based fauna and care should be taken to conserve habitat to improve potential for threatened fauna species survival. Potential habitat exists on site for threatened and migratory species.

Bird species have been recorded at the escarpment on a monthly basis by members of the Cumberland Bird Observers Club since 2008. A frog survey was conducted in 2010 by Arthur White. No surveys have been conducted for reptiles or mammals at this site and records are based on observations of workers.

Although no Fauna species protected by the NSW Threatened Species Act 1995 or the Environmental Protection and Biodiversity Conservation Act 1999 have been observed at the escarpment a wide variety of flora are present including 102 bird, frog, and 6 reptile species.

All native birds, reptiles, amphibians and mammals, except the dingo, are protected in NSW by the National Parks and Wildlife Act 1974. Land-based invertebrate (insects, snails etc) species are not protected by law in NSW, unless they are listed as threatened.

Table 3 Reptiles observed within the escarpment.

REPTILES AT THE ESCARPMENT		
Bearded Dragon	Red bellied Black Snake	Garden Skinks
Lace Monitor	Eastern Brown Snake	Blue Tongue Lizard

Table 4 Frogs observed within the escarpment.

FROGS AT THE ESCARPMENT		
Eastern Common Froglet	Tylers Tree Frog	Spotted Grass Frog
Perrons Tree Frog	Striped Marsh Frog	Smooth Toadlet
Eastern Banjo Frog	Whistling Tree Frog	Eastern Dwarf Tree Frog

Table 5 Birds observed within the escarpment.

NAME	DATE LAST OBSERVED	STATUS
Brown Quail	18/07/2013	
Black Swan	20/06/2013	
Australian Woodduck	22/08/2013	
Pacific Black Duck	28/11/2013	
Grey Teal	23/05/2013	
Chestnut Teal	23/05/2013	
Hardhead	28/11/2013	
Australasian Grebe	28/11/2013	
Hoary headed Grebe	18/07/2013	
Great crested Grebe	23/05/2013	
Darter	23/05/2013	
Little Pied Cormorant	20/06/2013	
Little Black Cormorant	28/11/2013	
Pelican	23/05/2013	
White Faced Heron	28/11/2013	
Great Egret	20/06/2013	

White Ibis	26/04/2013	
Straw Necked Ibis	21/02/2013	
Yellow Billed Spoonbill	20/06/2013	
Pacific Baza	20/06/2013	
Black Shouldered Kite	23/05/2013	
Whistling Kite	20/06/2013	
Spotted Harrier	23/05/2013	Vulnerable NSW TSC act
Little Eagle	28/11/2013	Vulnerable NSW TSC act
Australian Spotted Crake	22/11/2012	
Purple Swamphen	28/11/2013	
Dusky Moorhen	20/06/2013	
Eurasian Coot	28/11/2013	
Black Winged Stilt	21/02/2013	
Black Fronted Dotteral	21/02/2013	
Masked Lapwing	22/11/2013	
Crested Pigeon	19/12/2011	
Yellow Tailed Black Cockatoo	20/06/2013	
Galah	22/08/2013	
Little Corella	26/07/2012	
Rainbow Lorikeet	22/08/2013	
Little Lorikeet	26/07/2012	Vulnerable NSW TSC act
Eastern Rosella	21/02/2013	
Horsefields Bronze Cuckoo	19/12/2011	
Common Koel	28/11/2013	
Kookaburra	22/11/2012	
Sacred Kingfisher	28/11/2013	
Superb Fairy Wren	28/11/2013	
Spotted Pardalote	22/08/2013	
Striated Pardalote	26/07/2012	
White Browed Scrubwren	22/11/2012	
Weebill	22/08/2013	
Brown Gerygone	28/11/2013	
White Throated Gerygone	28/11/2013	
Buff Rumped Thornbill	21/03/2013	
Yellow Thornbill	22/08/2013	
Noisy Friarbird	22/08/2013	
Bell Minor	28/11/2013	
Noisy Minor	22/08/2013	
Lewins Honeyeater	22/08/2013	
Yellow Faced Honeyeater	28/11/2013	
White plumed Honeyeater	28/11/2013	
Brown Headed Honeyeater	22/08/2013	
Eastern Spinebill	18/07/2013	
Scarlet Honeyeater	22/08/2013	
Scarlet Robin	22/08/2013	Vulnerable NSW TSC act
Rose Robin	22/08/2013	
Eastern Yellow Robin	18/07/2013	

Eastern Whipbird	22/11/2012	
Varied Sitella	22/08/2013	Vulnerable NSW TSC act
Golden Whistler	22/08/2013	
Rufous Whistler	28/11/2013	
Grey Shrike Thrush	26/07/2012	
Restless Flycatcher	22/08/2013	
Magpie Lark	28/11/2013	
Grey Fantail	28/11/2013	
Willie Wagtail	28/11/2013	
Black Faced Cuckoo Shrike	28/11/2013	
White Winged Triller	25/10/2012	
Olive Backed Oriole	22/08/2013	
Dusky Woodswallow	28/11/2013	
Grey Butcherbird	22/08/2013	
Magpie	22/08/2013	
Australian Raven	22/08/2013	
White Winged Chough	21/03/2013	
Zebra Finch	20/06/2013	
Double Barred Finch	12/04/2012	
Red Browed Finch	28/11/2013	
Chestnut Breasted Manikin	23/05/2013	
Welcome Swallow	28/11/2013	
Fairy Martin	22/08/2013	
Red Whiskered Bulbul	22/08/2013	Exotic
Clamorous Reed Warbler	28/11/2013	
Rufus Songlark	19/12/2011	
Golden Headed Cisticola	28/11/2013	
Silvereye	22/11/2012	
Silvereye (Tasmanian)	22/08/2013	
Common Myna	23/05/2013	Exotic

4.0 IMPACT ASSESSMENT

It is proposed to subdivide the Escarpment block into nine smaller blocks ranging from 2.066-5.142 hectares. Generally speaking the blocks have been designed to take advantage of the open grassland as potential building locations. See Figure 2

Due to the presence of listed species, the habitat quality of the site and the connection to larger areas of native vegetation in the surrounding area, there is the potential to impact upon Endangered Ecological Communities and threatened species through the development of this site. Potential impacts are outlined below.

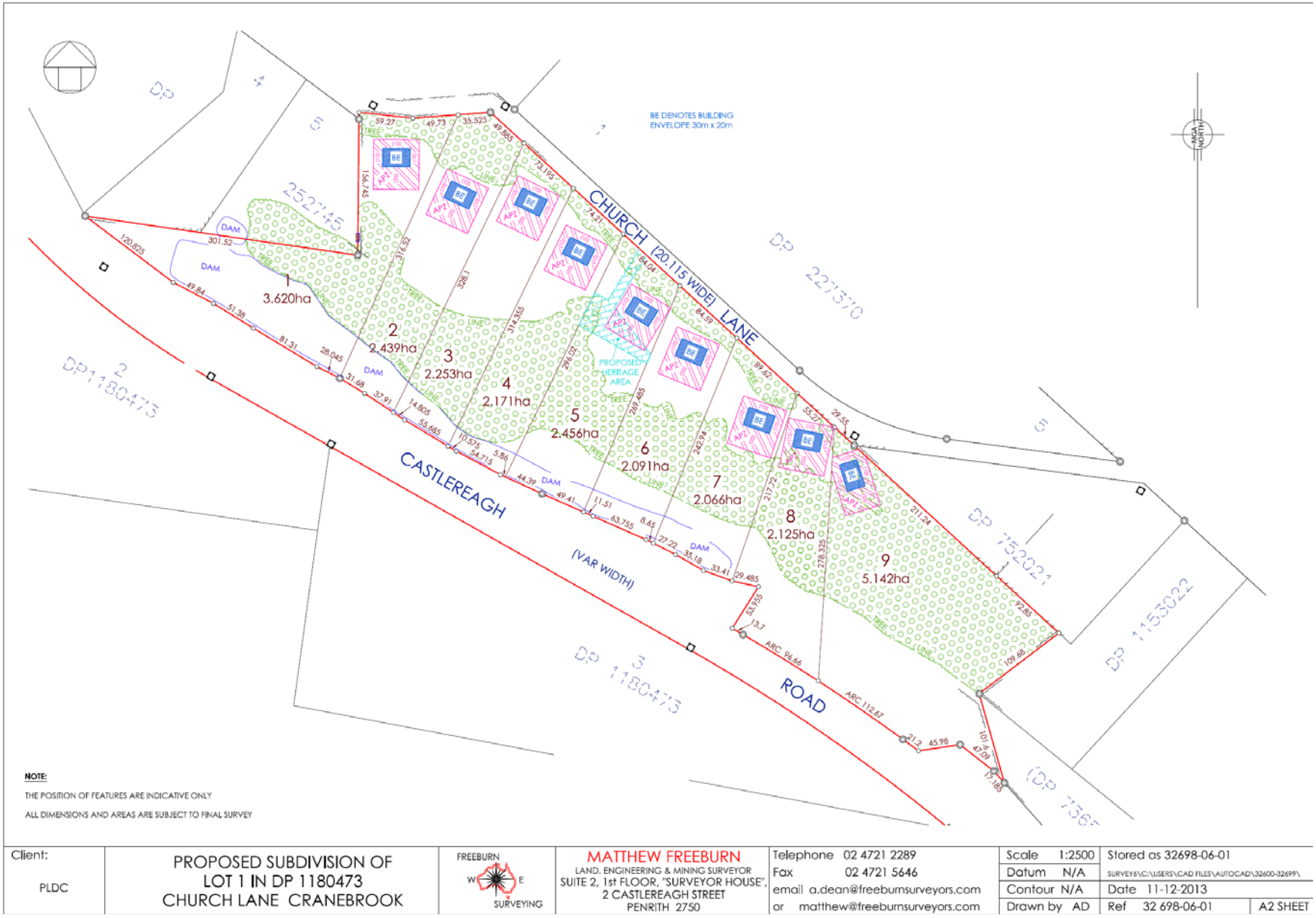

Figure 2: The proposed subdivision of the Escarpment area.

4.1 BLOCK 1 – 4

The position of the Asset Protection Zone and Building Envelope in blocks 1-4 are positioned entirely within the open grassland.

There are only a small number of *Grevillea juniperina* spp. *Juniperina* scattered through the vegetation adjacent to Church Lane and as such driveways could be installed without having to destroy any.

Treating blocks 1-4 in this manner will result in the retention of the majority of mature native vegetation. As such the development will have minimal impact upon Endangered Ecological Communities and threatened species.

4.2 BLOCK 5

The position of the Asset Protection Zone and Building Envelope in block 5 is positioned entirely within the open grassland.

There are a number of *Grevillea juniperina* spp. *Juniperina* scattered through the vegetation adjacent to Church Lane. There is already an access point in block 5 from Church lane and as such a driveway could be installed in this location with minimal vegetation removal.

Treating block 5 in this manner will result in the retention of majority of mature native vegetation. As such the development will have minimal impact upon Endangered Ecological Communities and threatened species.

4.3 BLOCK 6-7

The position of the Asset Protection Zone and Building Envelope in blocks 6-7 are positioned entirely within the open grassland.

There are a number of *Grevillea juniperina* spp. *Juniperina* scattered through the vegetation adjacent to Church Lane. Driveways would have to be positioned in locations where they are the thinnest. Additional plants could be planted within these blocks to compensate with suitable positions located in the open grassland at the bottom of the escarpment.

Treating blocks 6-7 in this manner will result in the retention of majority of mature native vegetation. As such the development will have minimal impact upon Endangered Ecological Communities and threatened species.

4.4 BLOCK 8 - 9

The position of the Asset Protection Zone and Building Envelope in blocks 8 and 9 are positioned primarily within the open grassland resulting in clearing of majority of trees and shrubs.

There are no *Grevillea juniperina* spp. *Juniperina* within the vegetation adjacent to Church Lane in these two blocks. Driveways could be installed to them with minimal vegetation removal.

As such they will have minimal impact upon Endangered Ecological Communities and threatened species.

Treating blocks 8-9 in this manner will result in the retention of majority of mature native vegetation. No threatened flora species will be harmed in this process. As such the development will have minimal impact upon Endangered Ecological Communities and threatened species.

5.0 RECOMENDATIONS

Opportunities exist for limited rural development of this site.

Future development plans should consider the use of native species to be visually consistent with the surrounding environment.

Development to take into consideration the presence of threatened species and be limited to grassland area.

6.0 APPENDIX A

INTRODUCTION

The Seven-Part Test is a standard set of questions devised by the Scientific Committee established under the *Threatened Species Conservation Amendment Act 2002.* The Test should be applied individually to all threatened species, populations and ecological communities and their habitats that are to be, or likely to be, on the site to be developed. The results of a Seven-Part Test help determine the nature and significance of impacts of the proposed development or activity on threatened species, populations or ecological communities, or their habitats, and whether the preparation of *Species Impact Statement* (SIS) is required. An SIS provides a more detailed assessment of threatened biota issues and proposes measures to manage and mitigate adverse impacts on the threatened species, populations or ecological communities, or their habitats, resulting from the proposal.

Appendix A provides a Seven-part test for the following threatened biota in relation to the proposed development:

Threatened Ecological Communities

- Cumberland Plain Woodland
- River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin & South East Bioregions.
- Shale Sandstone Transition Forest

Threatened Plant Species

- Juniper Leaved Grevillea (*Grevillea juniperina sub juniperina)*

Threatened Bird Species

- Varied Sittella (*Dapheonositta chrysoptera*).
- Scarlet Robin (*Petroica boodang*).
- Spotted Harrier (*Circus assimilis)*
- Little Eagle (*Aquila morphnoides)*
- Little Lorikeet (*Glossopsitta pusilla)*

6.1 THREATENED ECOLOGICAL COMMUNITIES

6.1.1 Cumberland Plain Woodland

Cumberland Plain Woodland is listed as a Critically-endangered Ecological Community under the schedules of both the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and NSW *Threatened Species Conservation Act, 1995* (TSC Act). It comprises the Spotted Gum (*Corymbia maculata*) Forest (Map Unit 9b), Grey Box (*Eucalyptus moluccana*) Woodland (Map Unit 10c) and Grey Box-Ironbark Woodland (Map Unit 10d) that were described in the natural vegetation 1:100,000 map sheets of Penrith (Benson 1992) and Sydney (Benson & Howell 1994).

NPWS (2000) identified and mapped two forms of CPW: Shale Plains Woodland (SPW) and Shale Hills Woodland (SHW). Shale Hills Woodland occurs mainly on the elevated and sloping southern half of the Cumberland Plain and Shale Plain Woodland occurs on other parts of the Cumberland Plain and is thus more widely distributed.

The dominant canopy trees of SHW include Grey Box (*Eucalyptus moluccana*), Forest Red Gum (*E. tereticornis*) and Narrow-leaved Ironbark (*E. crebra*). It has a shrub layer dominated by Blackthorn (*Bursaria spinosa*), with other shrubs, such as Acacia *Acacia implexa*, *Indigofera australis* and *Dodonaea viscosa* ssp*. cuneata*.

Bursaria spinosa is the dominant shrub species of SPW and there are canopy trees such as Grey Box (*E. moluccana*), Forest Red Gum (*E. tereticornis*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*E. eugenoides*).

The diverse understorey layer is similar for both forms of CPW. It is common to find grasses, such as Kangaroo Grass (*Themeda australis*), Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*) and herbs such as Kidney Weed (*Dichondra repens*), Blue Trumpet (*Brunoniella australis*) and *Desmodium varians*.

Before European settlement, CPW was extensive across western Sydney, covering 122,000 ha. Today, there is only 8% of the original extent, with a further 13% remaining as scattered trees across the landscape. It occurs on well structure clay soils that are derived from the Wianamatta Shale.

There are bushland remnants of CPW in an area bounded by Scheyville (north), Penrith (west), Parramatta (east) and Thirlmere (south). CPW occurs in Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly local government areas.

Clearing for agriculture and urban development is the greatest threat to CPW. Because it presently exists only as isolated fragments, CPW is vulnerable to disturbances, such as weed invasion, increased soil nutrients, rubbish dumping and fire. Weeds such as African Lovegrass, African Olive Bridal Veil Creeper and Rhodes Grass are a major threat.

6.1.2 River-flat Eucalypt Forest on Coastal Floodplains (Alluvial Woodland)

This ecological community is associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less.

River-Flat Eucalypt Forest on Coastal Floodplains generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically these forests and woodlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum)*, E. amplifolia* (cabbage gum)*, Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple).

Eucalyptus baueriana (blue box)*, E. botryoides* (bangalay) and *E. elata* (river perppermint) may be common south from Sydney, *E. ovat*a (swamp gum) occurs on the far south coast, *E. saligna* (Sydney blue gum) and *E. grandis* (flooded gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. Other eucalypts including *Eucalyptus longifolia* (woollybutt)*, E. moluccana* (grey box) and *E. viminalis* (ribbon gum) may be present in low abundance or dominant in limited areas of the distribution. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (prickly-leaved teatree)*, Backhousia myrtifolia* (grey myrtle)*, Melia azaderach* (white cedar)*, Casuarina cunninghamiana* subsp. *cunninghamiana* (river oak) and *C. glauca* (swamp oak). Scattered shrubs include *Bursaria spinosa* subsp*. spinosa*

(blackthorn), *Solanum prinophyllum* (forest nightshade), *Rubus parvifolius* (native raspberry), *Breynia oblongifolia* (coffee bush), *Ozothamnus diosmifolius, Hymenanthera dentata* (tree violet), *Acacia floribunda* (white sally) and *Phyllanthus gunnii*. The groundcover is composed of abundant forbs, scramblers and grasses including *Microlaena stipoides* (weeping grass), *Dichondra repens* (kidney weed), *Glycine clandestina, Oplismenus aemulus, Desmodium gunnii, Pratia purpurascens* (whiteroot), *Entolasia marginata* (bordered panic), *Oxalis perennans* and *Veronica plebeia* (trailing speedwell). The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs.

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions has been extensively cleared and modified. Large areas that formerly supported this community are occupied by exotic pastures grazed by cattle, market gardens and other cropping enterprises (e.g. turf). In the lower Hunter region, about one-quarter of the original extent was estimated to have remained during the 1990s, while less than one-quarter remained on the Cumberland Plain in 1998. In the Sydney - South Coast region, less than one-fifth was estimated to remain in the late 1990s, in the Eden region about 30% was estimated to remain during the 1990s.

Land clearing continues to threaten River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. A small minority of the remaining area occurs on public land, with most occurring on productive agricultural land or in close proximity to rural centres. The remaining stands are severely fragmented by past clearing and are further threatened by continuing fragmentation and degradation, flood mitigation and drainage works, landfilling and earthworks associated with urban and industrial development, pollution from urban and agricultural runoff, weed invasion, overgrazing, trampling and other soil disturbance by domestic livestock and feral animals including pigs, activation of 'acid sulfate soils', removal of dead wood and rubbish dumping. Anthropogenic climate change may also threaten River-Flat Eucalypt Forest on Coastal Floodplains if this affects future flooding regimes. Localised areas, particularly those within urbanised regions, may also be exposed to frequent burning whichreduces the diversity of woody plant species. Clearing of native vegetation; Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands; Invasion of native plant communities by exotic perennial grasses; Predation, habitat destruction, competition and disease transmission by feral pigs; Anthropogenic climate change; High frequency fire; and Removal of dead wood and dead trees are listed as Key Threatening Processes under the Threatened Species Conservation Act (1995).

Very few examples of River-Flat Eucalypt Forest on Coastal Floodplains remain unaffected by weeds. The causes of weed invasion include physical disturbance to the vegetation structure of the community, dumping of landfill rubbish and garden refuse, polluted runoff from urban and agricultural areas, construction of roads and other utilities, and grazing by domestic livestock. The principal weed species affecting River-Flat Eucalypt Forest on Coastal Floodplains include *Anredera cordifolia* (madeira vine), *Araujia sericiflora* (moth plant), *Asparagus asparagoides* (bridal creeper), *Axonopus fissifolius* (narrow-leaved carpet grass), *Bidens pilosa* (cobbler's peg), *Cardiospermum grandiflorum* (balloon vine), *Cirsium vulgare* (spear thistle), *Conyza bonariensis* (flaxleaf fleabane), *C. sumatrensis* (tall fleabane), *Gleditsea triacanthos* (honey locust), *Hypochaeris radicata* (catsear), *Ipomoea* spp. (morning glories), *Lantana camara* (lantana), *Ligustrum lucidum* (large-leaved privet), *L. Sinense* (small-leaved privet), *Lonicera japonica* (Japanese honeysuckle), *Macfaydyena unguis-cati* (cat's claw creeper), *Olea europea* subsp. *cuspidata* (African olive), *Plantago lanceolata* (plantain), *Rubus* fruticosis agg. (blackberries), *Senecio madagascariensis* (fireweed), *Senna pendula* var. *glabrata, Setaria parviflora* (slender pigeon grass), *Sida rhombifolia* (paddy's lucerne), *Sonchus oleraceus* (common sowthistle), *Tradescantia fluminensis* (wandering jew), *Verbena bonariensis* (purpletop), *Paspalum dilatatum* (paspalum), *P. urvillei* and *Pennisetum clandestinum* (kikuyu).

6.2 THREATENED SPECIES

6.2.1 Juniper Leaved Grevillea (Grevillea juniperina sub juniperina)

Description

A broadly spreading to erect shrub to 2.5 m high. The leaves are prickly, narrow, often bright green, to 22 mm long and clustered along short lateral branches. Flowers are “spider-like”, 2.5 - 3.5 cm long and may be red to pinkish, yellow, pale orange or greenish.

Distribution

Endemic to Western Sydney, centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town.

Habitat and ecology

- Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels.
- Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.
- Associated canopy species within Cumberland Plain Woodland and Shale/Gravel Transition Forest include *Eucalyptus tereticornis, E. moluccana, E. crebra, E. fibrosa* and *E. eugenioides*. Understorey species include *Bursaria spinosa, Dillwynia sieberi, Ozothamnus diosmifolius, Daviesia ulicifolia, Acacia falcata, Acacia parramattensis, Themeda australis, Aristida ramosa, Cymbopogon refractus, Eragrostis brownii, Cheilanthes sieberi, Dianella revoluta* and *Goodenia hederacea*.
- In Castlereagh Woodland on more sandy soils the dominant canopy species are *Eucalyptus fibrosa, E. sclerophylla, Angophora bakeri* and *Melaleuca decora*. Understorey species include *Melaleuca nodosa, Hakea sericea, Cryptandra spinescens, Acacia elongata, Gonocarpus teucrioides, Lomandra longifolia* and the threatened species *Dillwynia tenuifolia, Pultenaea parviflora, Micromyrtus minutiflora* and *Allocasuarina glareicola*.
- Flowering may occur sporadically throughout the year, but particularly between July and October. Flowers are reported to be bird pollinated although bees have also been observed visiting flowers.
- Plants are killed by fire with regeneration solely from soil-stored seed. Fire leads to a sudden increase in the recruitment of seedlings. Germination experiments show that germination rates are improved by exposure to both smoke and heat. The frequency of fire is likely to be an important factor. If fires are too frequent there may be insufficient time to build up seed in the soil to replace plants killed in the fire.
- Physical disturbance of the soil appears to result in an increase in seedling recruitment. Has a tendency to colonise mechanically disturbed areas
- Dense growth of blackthorn (Bursaria) can limit the ability of the species to spread.
- Most prolific seeding occurs on plants more than 1m high.

6.2.2 Varied Sittella (Dapheonositta chrysoptera).

Discription

The Varied Sittella is a small (10 cm) songbird with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet. In flight the orange wing-bar and white rump are prominent. In NSW most individuals have a grey head and are streaked with dark brown, but in the extreme north-east they have a white head, and in the extreme south-west a black cap. Varied Sittellas are more active and acrobatic among branches than the larger treecreepers. They fly into the heads of trees, typically working their way down branches and trunk with constant motion.

Distribution

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.

Habitat and ecology

- Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.
- Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.
- Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.
- Generation length is estimated to be 5 years.

6.2.3 Scarlet Robin (*Petroica boodang*).

Description

The Scarlet Robin is a small Australian robin that reaches 13 cm in length. The male has a black head and upperparts, with a conspicuous white forehead patch, white wing stripes and white tail-edges. The male has a bright scarlet-red chest and a white belly. The female is pale brown, darker above, and has a dull reddish breast and whitish throat. The whitish mark on the female's forehead is smaller than the male's. The female Scarlet Robin also has white wing and tail markings. Immature males resemble females. The main call of Scarlet Robin is a soft, warbling trill.

Distribution

The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west 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.

Habitat and ecology

- The Scarlet Robin 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 breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude.
- 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, and grasslands or grazed paddocks with scattered trees.
- The Scarlet Robin is a quiet and unobtrusive species which is often quite tame and easily approached.
- Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer.
- Scarlet Robin pairs defend a breeding territory and mainly breed between the months of July and January; they may raise two or three broods in each season.
- This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.
- Eggs are pale greenish-, bluish- or brownish-white, spotted with brown; clutch size ranges from one to four.
- Birds usually occur singly or in pairs, occasionally in small family parties; pairs stay together year-round.
- In autumn and winter, the Scarlet Robin joins mixed flocks of other small insectivorous birds which forage through dry forests and woodlands.

6.2.4 Spotted Harrier (*Circus assimilis)*

Description

The Spotted Harrier is a medium-sized, slender bird of prey having an owl-like facial ruff that creates the appearance of a short, broad head, and long bare yellow legs. The upperparts are blue-grey with dark barring, and the wingtips are black. The face, innerwing patch, and underparts are chestnut. The long tail is boldly banded, with a wedge-shaped tip. Juveniles are mottled and streaked ginger and brown, with prominent ginger shoulders, fawn rump and banded tail.

Distribution

The Spotted Harrier 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.

Habitat and ecology

- 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.
- Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.
- Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.

6.2.5 Little Eagle (Aquila morphnoides)

Description

The Little Eagle is a medium-sized bird of prey that occurs in two colour forms: either pale brown with an obscure underwing pattern, or dark brown on the upperparts and pale underneath, with a rusty head and a distinctive underwing patter of rufous leading edge, pale ‘M’ marking and black-barred wingtips. Both forms have a black-streaked head with a slight crest, a pale shoulder band on the upperwings, a rather short and square-tipped barred tail, and feathered legs.

Distribution

The 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.

Habitat and ecology

- 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.

6.2.6 Little Lorikeet (Glossopsitta pusilla)

Description

The Little Lorikeet is a small (16-19 cm; 40 g) bright green parrot, with a red face surrounding its black bill and extending to the eye. The undertail is olive-yellow with a partly concealed red base, and the underwing coverts are bright green. The mantle is imbued with light brown. The call in flight is diagnostically different from other lorikeets, being a shrill and rolling screech: ‘zit-zit’ or ‘zzet’. Although difficult to observe while foraging high in treetops, a flock’s constantly chattering contact calls give it away. Flight is fast, direct and through or above the canopy.

Distribution

The 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.

Habitat and ecology

- Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* 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
- Gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries.
- Roosts in treetops, often distant from feeding areas.
- Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*.
- Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.

6.3 SEVEN-PART TEST

(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.

Woodland areas on the subject site provide potential foraging and wildlife corridor habitat for local populations of threatened species. Trees bearing hollows Tree canopies and understorey vegetation provide potential nesting habitat. However, the amount of woodland to be cleared is a negligible amount of habitat that is available in the locality and broader geographical region. Similar-quality breeding habitat for each of these species occurs in conservation areas in the locality.

The proposed development would remove a negligible amount of potential foraging habitat for threatened species. The local wildlife corridor will not be significantly narrowed, fragmented or isolated as a result of the proposed subdivision.

Therefore, it is considered unlikely that the proposed development would adversely affect the life cycle of threatened woodland species to the extent that it would place viable local populations of these species 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.

No endangered populations are present at or will be affected by the proposed action.

(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.

(i) The proposed subdivision will result in the removal of 0.3 ha of regrowth CPW. This remnant

is isolated from other CPW remnants. Approximately 10,612 ha of CPW occur on the Cumberland Plain (DECCW 2011) and 2,067 ha occur in the Penrith LGA (NPWS 2000). Therefore, the proposed development would result in the removal of only 0.002% of the total area of CPW on the Cumberland Plain and 0.014% of CPW that occurs in the Penrith LGA. Consequently, it is unlikely that the proposed development would adversely affect CPW to the extent that its local occurrence would be placed at risk of extinction.

The proposed development would not result in the removal of Alluvial Woodland because it occurs along the bottom of the site where no development is proposed.

(ii) No CPW or Alluvial Woodland species will disappear from the Penrith LGA or have a significantly elevated risk of becoming locally extinct, as a result of the proposed development.

(d) In relation to a 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.

(i) A negligible amount of potential habitat for threatened species or ecological communities will be cleared or modified as a result of the proposed rezoning and development. No endangered populations are present at or will be affected by the proposed action

(ii) The proposed development will not result in fragmentation or isolation of habitat.

(iii) The CPW on the subject site is a regenerating vegetation community on land that was formerly cleared. This vegetation potentially contributes to the genetic diversity of more intact local remnants of both CPW by exchanging pollen with individual plants in these remnants through dispersal by wind, insect, bird and arboreal vectors, and stormwater runoff. However, these trees are a negligible proportion of the total gene pool for CPW. Therefore, the removal of up 0.3 ha of CPW habitat for the subdivision is unlikely to significantly impact on the genetic diversity of local occurrences of this ecological community.

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

No critical habitat occurs in the locality.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

OEH has identified the following priority actions to help in the recovery CPW and Alluvial Woodland in NSW:

1. Management of EECs is to be included in school environmental management plans where the school land contains EECs.

2. Management of EECs to be included in the conditions for Crown land trusts, lease and licence holders.

3. Prepare and implement community awareness, education and involvement strategy.

4. Support community conservation by providing nursery or other facilities, for regeneration activities.

5. Local Govt prepare plans of management in accordance with the Local Government Act for reserves containing EECs, which have conservation as a primary objective, or where conservation is compatible.

6. Promote best practice management guidelines.

7. Incorporate consideration of EEC protection in regional open space planning.

8. Encourage planning authorities to address EECs in development of environmental planning instruments and, where possible, seek biodiversity certification.

9. Manage, to best practice standards, areas of EECs which have conservation as a primary objective, or where conservation is compatible. Priorities are to be based on DEC conservation significance assessment.

10. Encourage and promote best-practice management of EECs on private land.

11. Ensure the consideration of impacts on EECs when enforcing noxious weed or pest species control in EECs.

12. Develop and implement Cumberland Plain Reservation Strategy and create a protected bushland network through targeted land acquisition as land becomes available.

13. Public authorities will promote management agreements to landholders through their ongoing land use planning activities.

14. Investigate the preparation of a recommendation for the declaration of critical habitat.

15. Investigate the development of a regular monitoring program to assess the change in extent of vegetation across the Cumberland Plain.

16. Finalise the multi-EEC recovery plan as a State priority in accordance with contractual obligations with DEH, by July 2007.

17. Liaise with institutions to facilitate research relevant to the recovery of Cumberland Plain EECs.

The proposed development is consistent with the priority actions listed above for protecting CPW and Alluvial Woodland in NSW.

There are no speciesd specific recovery plans or threat abatement plans under the Threatened Species Conservation Act 1995 for:

- Juniper Leaved Grevillea (Grevillea juniperina sub juniperina)
- Varied Sittella (*Dapheonositta chrysoptera*)
- Scarlet Robin (*Petroica boodang*)
- Spotted Harrier (*Circus assimilis)*
- Little Eagle (*Aquila morphnoides)*
- Little Lorikeet (*Glossopsitta pusilla)*

(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.

“Clearing of Native Vegetation” is a Key Threatening Process listed in Schedule 3 of the *Threatened Species Conservation Act, 1995*. However, the area of CPW to be cleared is relatively small. The proposed subdivision will not result in the loss of CPW species from the locality, and is unlikely to result in a significant loss of genetic diversity within CPW, either at a local or broader geographical level.

No Alluvial Woodland (River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin & South East Bioregions) would be removed as a result of the proposed development.

CONCLUSION

The proposed subdivision and development of the subject site will not significantly impact on the status of CPW or its habitats. Therefore, a Species Impact Statement is NOT required for this threatened ecological community in relation to the proposed development.

6.4 REFERENCES.

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