Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Litoria aurea	Green and Golden Bell Frog	E	V	This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (DECC 2007). Fast flowing streams are not utilised for breeding purposes by this species (Mahony 1999). Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (DECC 2007). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially bulrushes–Typha sp. and spikerushes–Eleocharis sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997). Ponds that are typically inhabited tend to be free from predatory fish such as Mosquito Fish (Gambusia holbrooki) (DECC 2007).	No	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Litoria raniformis	Southern Bell Frog	E	V	Relatively still or slow-flowing sites such as billabongs, ponds, lakes or farm dams, especially where bulrushes (Typha sp., Eleocharis sp. and Phragmites sp.) are present (DECC 2007; Ehmann 1997). This species is common in lignum shrublands, black box and River Red Gum woodlands, irrigation channels and at the periphery of rivers in the southern parts of NSW (DECC 2007). This species occurs in vegetation types such as open grassland, open forest and ephemeral and permanent non-saline marshes and swamps (DECC 2007). Open grassland and ephemeral permanent non-saline marshes and swamps have also been associated with this species (Ehmann 1997).	No	No
Mixophyes iteratus	Giant Barred Frog	E	E	Found on forested slopes of the escarpment and adjacent ranges in riparian vegetation, subtropical and dry rainforest, wet sclerophyll forests and swamp sclerophyll forest (DECC 2007; Ehmann 1997). This species is associated with flowing streams with high water quality, though habitats may contain weed species (Ehmann 1997). This species is not known from riparian vegetation disturbed by humans (NSW Scientific Committee 1999). During breeding eggs are kicked up onto an overhanging bank or the streams edge (DECC 2007).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
REPTILES						
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Typical sites consist of exposed sandstone outcrops and benching where the vegetation is predominantly woodland, open woodland and/or heath on Triassic sandstone of the Sydney Basin (DECC 2007). They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (Webb & Shine 1998b). Some of the canopy tree species found to regularly co-occur at known sites include *Corymbia eximia, C. gummifera, Eucalyptus sieberi, E. punctata* and *E.piperita* (DECC 2007).	No	No
DIURNAL BIRDS						

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Anthochaera Phrygia *(aka Xanthomyza phrygia)*	Regent Honeyeater	E	E & M	Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of River Oak (*Casuarina cunninghamiana*). Areas containing Swamp Mahogany (*Eucalyptus robusta*) in coastal areas have been observed to be utilised (NPWS 1997). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes (NPWS 1995). As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Environment Australia 2000).	Unlikely	No
Botaurus poiciloptilus	Australasian Bittern	V	-	Terrestrial wetlands with tall dense vegetation, occasionally estuarine habitats (Marchant & Higgins 1993). Reedbeds, swamps, streams, estuaries (Simpson & Day 1999).	Unlikely	No
Daphoenositta chrysoptera	Varied Sittella	V	-	Distribution includes most of mainland Australia except deserts and open grasslands. Prefers eucalypt forests and woodlands with rough-barked species, or mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods from bark, dead branches, or small branches and twigs.	Unlikely	No
Dasyornis	Eastern Bristlebird	E	E	Habitat is characterised by dense, low vegetation	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
brachypterus				including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, in the northern NSW population a lack of fire in grassy forest may be detrimental as grassy tussock nesting habitat becomes unsuitable after long periods without fire; northern NSW birds are usually found in habitats burnt five to 10 years previously.		
Hieraaetus morphnoides	Little Eagle	V	-	Utilises open eucalypt, sheoak and acacia forest, woodland or open woodland. Uses tall trees for nesting, with a large stick nest being built. Lays eggs in spring, and young fledge in early summer. Preys on birds, reptiles and mammals, and occasionally feeds on large insects or carrion.	Potential	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Lathamus discolor	Swift Parrot	E	E	Breeds in Tasmania between September and January. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts (Blakers et al. 1984; Schodde and Tidemann 1986). Hence, in this region, autumn and winter flowering eucalypts are important for this species. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*) (DECC 2007).	Unlikely	No
Lophoictinia isura	Square-tailed Kite	V	-	In coastal areas associated tropical and temperate forests and woodlands on fertile soils with an abundance of passerine birds (Marchant & Higgins 1993, DECC 2007). May be recorded inland along timbered watercourses (DECC 2007). In NSW it is commonly associated with ridge or gully forests dominated by Woollybutt (*Eucalyptus logifloria*), Spotted Gum (*E. maculata*), or Peppermint Gum (*E. elata, E. smithii*) (DECC 2007).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	Predominantly associated with box-ironbark association woodlands and River Red Gum (NSW Scientific Committee, 2001). Also associated with drier coastal woodlands of the Cumberland Plain and the Hunter, Richmond and Clarence Valleys (NSW Scientific Committee, 2001).	Unlikely	No
Petroica boodang	Scarlet Robin	V	-	Occurs from the coast to the inland slopes in NSW. After breeding (July-Jan), some disperse to the lower valleys and plains of the tablelands and slopes, and may appear as far west as the eastern edges of the inland plains in autumn and winter. Primarily resides in dry eucalypt forests and woodlands, with usually open and grassy understorey, with scattered shrubs. Abundant logs and fallen timber are important habitat components. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees, and may join mixed flocks of other small insectivorous birds.	Unlikely	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Petroica phoenicea	Flame Robin	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes, often on ridges and slopes, in NSW. Prefers clearings or areas with open understoreys, and grassy groundlayer for breeding habitat. Will often occur in recently burnt areas. Shrub density does not appear to be an important habitat factor. Many birds move to the inland slopes and plains in winter, or to drier more open habitats in the lowlands.	Unlikely	No
Rostratula australis (a.k.a. R. benghalensis)	Painted Snipe (Australian subspecies)	E	V	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (DECC 2007). Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (ibid.). Breeding is often in response to local conditions; generally occurs from September to December (DECC 2007). Roosts during the day in dense vegetation (NSW Scientific Committee 2004). Forages nocturnally on mud-flats and in shallow water (DECC 2007). Feeds on worms, molluscs, insects and some plant-matter (ibid.).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Stagonopleura guttata	Diamond Firetail	V	-	Typically found in grassy eucalypt woodlands, but also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities (DECC 2007). It is often found in riparian areas and sometimes in lightly wooded farmland (DECC 2007). Appears to be sedentary, though some populations move locally, especially those in the south (DECC 2007).	No (not recorded in database searches for locality)	Unlikely
NOCTURNAL BIRDS						
Tyto novaehollandiae	Masked Owl	V	-	Associated with forest with sparse, open, understorey, typically dry sclerophyll forest and woodland (DECC 2007) and especially the ecotone between wet and dry forest, and non forest habitat (Environment Australia 2000). Known to utilise forest margins and isolated stands of trees within agricultural land (Hyem 1979) and heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained (Kavanagh & Peake 1993).	Unlikely	No
MAMMALS (EXCLUDING BATS)						

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Dasyurus maculatus *Dasyurus maculatus maculatus*	Spotted-tailed Quoll Spotted-tailed Quoll (SE Mainland Population)	V -	- E	The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests (Mansergh 1984; DECC 2007j), more frequently recorded near the ecotones of closed and open forest. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in (DECC 2007). Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows (Environment Australia 2000).	No	No
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1995).	No	No
Potorous tridactylus *Potorous tridactylus tridactylus*	Long-nosed Potoroo Long-nosed Potoroo (SE Mainland Population)	V -	- V	Associated with dry coastal heath and dry and wet sclerophyll forests (Strahan 1998) with dense cover for shelter and adjacent more open areas for foraging (Menkhorst & Knight 2004).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Pseudomys novaehollandiae	New Holland Mouse	-	V	A small burrowing native rodent with a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Inhabits open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. A social animal, living predominantly in burrows shared with other individuals. The home range of the New Holland Mouse ranges from 0.44 ha to 1.4 ha and the species peaks in abundance during early to mid stages of vegetation succession typically induced by fire (DSEWPC 2010)	No	No
MAMMALS (BATS)						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; DECC 2007). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; DECC 2007).	Unlikely	No
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Prefers moist habitats with trees taller than 20m (DECC 2007). Roosts in tree hollows but has also been found roosting in buildings or under loose bark (DECC 2007).	Potential	Known

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V	-	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (Churchill 1998). It forages above and below the tree canopy on small insects (Dwyer 1995, Dwyer 1981). Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter (Environment Australia 2000, Dwyer 1995).	Potential	Known
Mormopterus norfolkensis	East Coast Freetail Bat	V	-	Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range (Churchill 1998). Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges (Environment Australia 2000; Allison & Hoye 1998). Primarily roosts in hollows or behind loose bark in mature eucalypts, but have been observed roosting in the roof of a hut (Environment Australia 2000; Allison & Hoye 1998).	Potential	Known
Myotis macropus (formerly *M. adversus*)	Southern Myotis, Large-footed Myotis	V	-	The Large-footed 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. Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to	Potential	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
				water (Churchill 1998). While roosting (in groups of 10-15) is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains (Churchill 1998). However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (Richards 1998). Forages over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (DECC 2005)		
Pteropus poliocephalus	Grey-headed Flying-Fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	Unlikely	No
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill, 1998), tending to be more frequently located in more productive forests (Hoye & Richards 1998). Within denser vegetation types use is made of natural and man made openings such as roads, creeks and small rivers, where it hawks backwards and forwards	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
				for prey (Hoye & Richards 1998).		
INVERTEBRATES						
Meridolum corneovirens	Cumberland (Large) Land Snail	E	-	Associated with open eucalypt forests, particularly Cumberland Plain Woodland. Found under fallen logs, debris and in bark and leaf litter around the trunk of gum trees or burrowing in loose soil around clumps of grass (NPWS 1997). Urban waste may also form suitable habitat (NSW NPWS 1997).	Unlikely	No
MIGRATORY TERRESTRIAL SPECIES LISTED UNDER EPBC ACT						
Apus pacificus	Fork-tailed Swift	-	M	Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas (Simpson & Day 1999).	Unlikely	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	M	Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Marchant & Higgins 1993, Simpson & Day 1999). Breeding habitat consists of tall trees, mangroves, cliffs, rocky outcrops, silts, caves and crevices and is located along the coast or major rivers. Breeding habitat is usually in or close to water, but may occur up to a kilometre away (Marchant & Higgins 1993).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Hirundapus caudacutus	White-throated Needletail	-	M	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Marchant & Higgins 1993; Simpson & Day 1999). Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Marchant & Higgins 1993).	No	No
Merops ornatus	Rainbow Bee-eater	-	M	Resident in coastal and subcoastal northern Australia; regular breeding migrant in southern Australia, arriving September to October, departing February to March, some occasionally present April to May (Pizzey and Doyle 1988). Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (ibid). Nest is a chamber a the end of a burrow, up to 1.6 m long, tunnelled in flat or sloping ground, sandy back or cutting (*ibid*).	No	No
Monarcha melanopsis	Black-faced Monarch	-	M	Rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al. 1984).	No	No
Myiagra cyanoleuca	Satin Flycatcher	-	M	Wetter, denser forest, often at high elevations (Simpson & Day 2004).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Rhipidura rufifrons	Rufous Fantail	-	M	The Rufous Fantail is a summer breeding migrant to southeastern Australia (Morcombe, 2004). The Rufous Fantail is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation (Morcombe, 2004). Open country may be used by the Rufous Fantail during migration (Morcombe, 2004).	No	No
MIGRATORY WETLAND SPECIES LISTED UNDER EPBC ACT						

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Ardea alba	Great Egret	-	M	The Great Egret is common and widespread in Australia (McKilligan, 2005). The Eastern Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs (Kushlan & Hancock 2005; Marchant & Higgins 1990; Martínez-Vilalta & Motis 1992). The species usually frequents shallow waters. It forages in a wide range of wet and dry habitats including permanent and ephemeral freshwaters, wet pasture and estuarine mangroves and mudflats (McKilligan, 2005).	Potential	Potential

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Ardea ibis	Cattle Egret	-	M	Cattle Egrets forage on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes and they avoid marine environments (McKilligan, 2005). Some individuals stay close to the natal heronry from one nesting season to the next, but the majority leave the district in autumn and return the next spring. Cattle Egrets are likely to spend the winter dispersed along the coastal plain and only a small number have been recovered west of the Great Dividing Range (McKilligan, 2005).	Potential	Known

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Gallinago hardwickii	Latham's Snipe	-	M	A variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover (Marchant and Higgins 1999). Occupies a variety of vegetation around wetlands (Marchant and Higgins 1999) including wetland grasses and open wooded swamps (Simpson and Day 1999). Latham's Snipe sometimes occur in habitats that have saline or brackish water, such as saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers (Frith et al. 1977; Naarding 1983). These habitats are most commonly used when the birds are on migration (Frith et al. 1977). They are regularly recorded in or around modified or artificial habitats including pasture, ploughed paddocks, irrigation channels and drainage ditches, ricefields, orchards, saltworks, and sewage and dairy farms (Fielding 1979; Frith et al. 1977; Lane & Jessop 1985; Naarding 1982, 1983). They can also occur in various sites close to humans or human activity (e.g. near roads, railways, airfields, commercial or industrial complexes) (Frith et al. 1977; Naarding 1983).	Known	Known
PLANTS						

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Acacia pubescens	Downy Wattle	V	V	*Acacia pubescens* occurs on the NSW Central Coast in Western Sydney, mainly in the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. It is associated with Cumberland Plains Woodlands, Shale / Gravel Forest and Shale / Sandstone Transition Forest growing on clay soils, often with ironstone gravel (NPWS 1997; Benson and McDougall 1996).	No	No
Cynanchum elegans	White-flowered Wax Plant	E	E	*Cynanchum elegans* is a climber or twiner with a variable form, and flowers between August and May, peaking in November (DEC 2005). It occurs in dry rainforest gullies, scrub and scree slopes, and prefers the ecotone between dry subtropical rainforest and sclerophyll woodland/forest (NPWS 1997). The species has also been found in littoral rainforest; Leptospermum laevigatum – *Banksia integrifolia subsp. integrifolia* coastal scrub; *Eucalyptus tereticornis* open forest/ woodland; *Corymbia maculata* open forest/woodland; and *Melaleuca armillaris* scrub to open scrub (DEC 2005).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Dillwynia tenuifolia	Dillwynia tenuifolia population at Kemps Creek	E2		This endangered population of *Dillwynia tenuifolia* occurs in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local Government Area, Western Sydney. It occurs on a small outlier of the Berkshire Park Soil Landscape in vegetation that is a transition between Castlereagh Ironbark Forest and Castlereagh Scribbly Gum Woodland (DEC 2005).	No	No
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	V		*Grevillea juniperina subsp. juniperina* is 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. It grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium, typically containing lateritic gravels (DEC 2005).	No	No
Grevillea parviflora subsp. *parviflora*	Small-Flower Grevillea	V	V	*Grevillea parviflora subsp. parviflora* is sporadically distributed throughout the Sydney Basin mainly around Picton, Appin and Bargo. Separate populations are also known further north from Putty to Wyong and Lake Macquarie and Cessnock and Kurri Kurri. It grows in sandy or light clay soils over thin shales, often with lateritic ironstone gravels. It often occurs in open, slightly disturbed sites such as tracks (DEC 2005).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Marsdenia viridiflora subsp. *viridiflora*	*Marsdenia viridiflora* subsp. *viridiflora* population in the Blacktown & Other Local Govt areas	E2		This Endangered Population of *Marsdenia viridiflora subsp. viridiflora* occurs in the Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys areas of Western Sydney. It grows in vine thickets and open shale woodland (DEC 2005).	No	No
Persoonia nutans	Nodding Geebung	E	E	Associated with dry woodland, Castlereagh Scribbly Gum Woodland, Agnes Banks Woodland and sandy soils associated with tertiary alluvium, occasionally poorly drained (Benson and McDougall 2000). Endemic to the Western Sydney (Benson and McDougall 2000).	No	No
Pilularia novae-hollandiae	Austral Pilwort	E		*Pilularia novae-hollandiae* has been recorded in southern NSW from a number of widely separated coastal and inland localities. It grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous (DEC 2005).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Pimelea curviflora var. *curviflora*	*Pimelea curviflora* var. *curviflora*	V	V	*Pimelea curviflora* var. *curviflora* is confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. It grows on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands (DEC 2005). Associated with the Duffys Forest Community, shale lenses on ridges in Hawkesbury sandstone geology.	No	No
Pimelea spicata	Spiked Rice Flower	E	E	In western Sydney, *Pimelea spicata* occurs on an undulating topography of well structured clay soils, derived from Wianamatta shale (DEC 2004). It is associated with Cumberland Plains Woodland (CPW), in open woodland and grassland often in moist depressions or near creek lines (Ibid.). Has been located in disturbed areas that would have previously supported CPW (Ibid.).	No	No
Pomaderris brunnea	Rufous Pomaderris	V	V	*Pomaderris brunnea* occurs in a limited area around the Colo, Nepean and Hawkesbury Rivers as well as near Walcha on the Northern Tablelands. It grows in moist woodland or forest on clay or alluvial soils of floodplains and creek lines (DEC 2005).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Pterostylis gibbosa	Illawarra Greenhood	E	E	Known from a small number of populations in the upper Hunter Valley (Milbrodale), the Illawarra region (Albion Park and Yallah) and near Nowra (DEC 2005). Plants grow in a variety of woodland and open forest communities with shallow rocky soils.	No	No
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Terrestrial orchid predominantly found in Hawkesbury Sandstone Gully Forest growing in small pockets of soil that have formed in depressions in sandstone rock shelves (NPWS 1997). Known from Georges River National Park, Ingleburn, Holsworthy, Peter Meadows Creek, St Marys Tower (NSW Scientific Committee 1999).	No	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence	
					Before surveys	Post surveys
Pultenaea parviflora	*Pultenaea parviflora*	E	V	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays (DEC 2005). May also be common in ecotone between these communities and Castlereagh Scribbly Gum Woodland (ibid.). *Eucalyptus fibrosa* is usually the dominant canopy species (ibid.). *E. globoidea, E. longifolia, E. parramattensis*, *E. sclerophylla* and *E. sideroxylon* may also be present or co-dominant, with *Melaleuca decora* frequently forming a secondary canopy layer (ibid.). Associated species may include *Allocasuarina littoralis, Angophora bakeri, Aristida spp. Banksia spinulosa, Cryptandra spp., Daviesia ulicifolia, Entolasia stricta, Hakea sericea, Lissanthe strigosa, M. nodosa, Ozothamnus diosmifolius* and *Themeda australis* (ibid.). Often found in association with other threatened species such as *Dillwynia tenuifolia, Dodonaea falcata, Grevillea juniperina, Micromyrtus minutiflora, Persoonia nutans* and *Styphelia laeta* (ibid.). Flowering may occur between August and November (ibid.).	No	No

Appendix B: Flora and Fauna Lists

Flora List

Threatened Ecological Community							Cumberland Plain Woodland			River-flat Eucalypt Forest	N/A	
Vegetation Community (NPWS 2002)							Shale Plains Woodland			Alluvial Woodland	Weeds and exotics/exotic grassland (as per ELA 2012)	
Biometric Vegetation Type (DECC 2008)							Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain			Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain		
Family	**Genus**	**Species**	**Common name**	**CPW Species**	**Native/Exotic**	**Type**	**BB01**	**BB02**	**BB03**	**BB04**	**BBO5**	**Opportunistic**
Adiantaceae	Cheilanthes	sieberi		Yes	Native	fern		1	2	2		
Alliaceae	Nothoscordum	borbonicum	Onion Weed		Exotic	Herb	2	1	1			
Amaranthaceae	**Alternanthera**	**philoxeroides**	**Alligator Weed**		**Exotic**	**Herb**	**2**					
Apiaceae	Centella	asiatica	Indian Pennywort	Yes	Native	Herb	2					
Apocynaceae	Araujia	sericifera	Moth Vine		Exotic	Vine	2					
Asparagaceae	**Asparagus**	**asparagoides**	**Bridal Creeper**		**Exotic**	**Vine**	**1**			**2**		
Asparagaceae	Asparagus	officinalis	Asparagus		Exotic	Herb	2	2	1	2		
Asteraceae	Bidens	pilosa	Cobblers Pegs		Exotic	Herb	2	2				
Asteraceae	Bidens	subalternans	Greater Beggar's Ticks		Exotic	Herb	3	4a	2			
Asteraceae	Cirsium	vulgare	Thistle		Exotic	Herb		2				
Asteraceae	Conyza	spp	Fleabane		Exotic	Herb	2	4b	1	1		
Asteraceae	Hypochaeris	radicata	Flatweed		Exotic	Herb	2		1	2		
Asteraceae	Senecio	madagascariensis	Fireweed		Exotic	Herb	2	3	3			
Asteraceae	Sonchus	oleraceus	Common Sowthistle		Exotic	Herb	3	1	1	1		
Asteraceae	Taraxacum	officinale	Dandelion		Exotic	Herb				1		
Asteraceae	**Xanthium**	**sp.**			**Exotic**	**Herb**	**1**					
Cactaceae	**Opuntia**	**stricta**	**Common Prickly Pear**		**Exotic**	**Cactus**						**x**
Campanulaceae	Wahlenbergia	gracilis	Sprawling Bluebell	Yes	Native	Herb		2	2			
Caryophyllaceae	Stellaria	media	Common Chickweed		Exotic	Herb	2	1	2			
Chenopodiaceae	Einadia	trigonos	Fishweed	Yes	Native	Herb	1					
Chenopodiaceae	Einadia	hastata	Berry Saltbush	Yes	Native	Herb			3			
Clusiaceae	Hypericum	gramineum	Small St. Johns Wort	Yes	Native	Herb				2	2	
Commelinaceae	Commelina	cyanea	Native Wandering Jew	Yes	Native	Herb	3		4a	3		
Convolvulaceae	Dichondra	repens	Kidney Weed		Native	Herb	3	4a	2			
Crassulaceae	Crassula	sp			Exotic	Herb	1					
Cyperaceae	Carex	sp			Native	Sedge		2	2			
Fabaceae - Fabiodeae	Jacksonia	scoparia	Dogwood	Yes	Native	Shrub		1		4a		
Fabaceae - Faboideae	Desmodium	varians	Slender Tick-trefoil	Yes	Native	Herb			1			
Fabaceae - Faboideae	Glycine	tabacina		Yes	Native	Vine	2	3	2			
Fabaceae - Faboideae	Glycine	clandestina		Yes	Native	Vine		3	2			
Fabaceae - Faboideae	Glycine	microphylla		Yes	Native	Vine			1	2		

Threatened Ecological Community							Cumberland Plain Woodland			River-flat Eucalypt Forest	N/A	
Vegetation Community (NPWS 2002)							Shale Plains Woodland			Alluvial Woodland	Weeds and exotics/exotic grassland (as per ELA 2012)	
Biometric Vegetation Type (DECC 2008)							Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain			Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain		
Family	**Genus**	**Species**	**Common name**	**CPW Species**	**Native/Exotic**	**Type**	**BB01**	**BB02**	**BB03**	**BB04**	**BBO5**	**Opportunistic**
Fabaceae - Faboideae	Vicia	sativa			Exotic	Herb	1	1				
Fabaceae - Mimosoideae	Acacia	falcata			Native	Shrub	2					
Fabaceae - Mimosoideae	Acacia	ulicifolia	Prickly Moses		Native	Shrub			4b			
Fabaceae - Mimosoideae	Acacia	parramattensis	Parramatta Wattle		Native	Shrub						x
Geraniaceae	Geranium	homeanum		Yes	Native	Herb	1					
Hypoxidaceae	Hypoxis	hygrometrica var. hygrometrica	Golden Weather-grass		Native	Herb		1	3			
Lobeliaceae	Pratia	purpurascens	Whiteroot	Yes	Native	Herb	2		2			
Malvaceae	Pavonia	hastata	Pink Pavonia		Exotic	Shrub				1		
Malvaceae	Sida	rhombifolia	Paddy's Lucerne		Exotic	Shrub	5	2	2	4b		
Myrtaceae	Eucalyptus	tereticornis	Forest Red Gum	Yes	Native	Tree	4b	4b	4b	2		
Myrtaceae	Eucalyptus	amplifolia	Cabbage Gum	Yes	Native	Tree				2		
Myrtaceae	Eucalyptus	crebra	Narrow-leaved Ironbark	Yes	Native	Tree				1		
Myrtaceae	Eucalyptus	moluccana	Grey Box	Yes	Native	Tree						x
Myrtaceae	Melaleuca	decora			Native	tree		1				
Oleaceae	**Ligustrum**	**lucidum**	**Large Leaved Privet**		**Exotic**	**Shrub**						**x**
Oxalidaceae	Oxalis	sp.			Exotic	Herb	3					
Oxalidaceae	Oxalis	perennans		Yes	Native	Herb			3			
Pittosporaceae	Bursaria	spinosa subsp. spinosa	Native Blackthorn	Yes	Native	Shrub	4b	4a	2			
Plantaginaceae	Plantago	lanceolata	Lamb's Tongue		Exotic	Herb			1			
Poaceae	Aristida	vagans	Threeawn Speargrass	Yes	Native	Grass		1	2			
Poaceae	Axonopus	fissifolius	Narrow-leaved Carpet Grass		Exotic	Grass				2		
Poaceae	Bromus	catharticus	Prairie Grass		Exotic	Grass			1			
Poaceae	Chloris	ventricosa	Plump Windmill Grass	Yes	Native	Grass	2					
Poaceae	Cynodon	dactylon	Couch		Native	Grass					4b	
Poaceae	Digitaria	sp.			Exotic	Grass	3					
Poaceae	Ehrharta	erecta	Panic Veldtgrass		Exotic	Grass	2	6	6			
Poaceae	Eragrostis	curvula	African Lovegrass		Exotic	Grass			2	2	2	
Poaceae	Eragrostis	leptostachya	Paddock Lovegrass	Yes	Native	Grass	5	2	2	2		
Poaceae	Eriochloa	psuedoacrotricha	Early Spring Grass	Yes	Native	Grass	2					
Poaceae	Microlaena	stipoides	Weeping Grass	Yes	Native	Grass	5	2	5	7		
Poaceae	Paspalidium	distans		Yes	Native	Grass	4a	2	2			
Poaceae	Paspalum	dilatatum	Paspalum		Exotic	Grass	2	2	1		3	
Poaceae	Setaria	parviflora			Exotic	Grass	2	4a	3	2	2	
Poaceae	Sporobolus	creber	Western Rat-tail Grass	Yes	Native	Grass	3		3			
Poaceae	Sporobolus	virginicus	Sand Couch		Native	Grass			2			
Poaceae	Themeda	australis	Kangaroo Grass	Yes	Native	Grass		2	2			
Polygonaceae	Persicaria	decipiens	Slender Knotweed		Native	Herb	1					
Polygonaceae	Rumex	sp.			Native	Herb	2					

Threatened Ecological Community							Cumberland Plain Woodland			River-flat Eucalypt Forest	N/A	
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Biometric Vegetation Type (DECC 2008)							Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain			Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain		
Family	**Genus**	**Species**	**Common name**	**CPW Species**	**Native/Exotic**	**Type**	**BB01**	**BB02**	**BB03**	**BB04**	**BBO5**	**Opportunistic**
Rosaceae	**Rubus**	**fruticosis**	**Blackberry**		**Exotic**	**Shrub**						**x**
Solanaceae	**Lycium**	**ferroccissium**	**African Boxthorn**		**Exotic**	**shrub**				**1**		
Solanaceae	Solanum	prinophyllum	Forest Nightshade	Yes	Native	Herb	1					
Solanaceae	Solanum	americanum	Glossy Nightshade		Native	Herb	2	1	2			
Solanaceae	Solanum	pseudocapsicum	Madeira Winter		Exotic	Herb	1	3	2			
Solanaceae	Solanum	sisymbriifolium			Exotic	Herb	2					
Verbenaceae	**Lantana**	**camara**	**Lantana**		**Exotic**	**Shrub**						**x**
Verbenaceae	Verbena	sp.	Purpletop		Exotic	Herb	1	2			2	
	Briza	minor	Quaking Grass		Exotic	Grass					6	
	Cortaderia	**selloana**	**Pampas Grass**		**Exotic**	**Grass**						**x**
	Hypericum	perforatum	St John Wort		Exotic	Herb					2	
	Juncus	usitatus			Native	Sedge					2	
			TOTALS	**29**	**Native**	**43**	**20**	**17**	**24**	**10**	**3**	
					Exotic	**39**	**24**	**16**	**16**	**12**	**5**	
					Total	**82**	**44**	**33**	**40**	**22**	**8**	

* Species highlighted in bold are noxious weeds listed under the NSW Noxious Weed Act 1997 or Weeds of National Significance (CoA 2012)

Fauna

Class	Family	Genus	Species	Common name	Native/Exotic	ELA 2012	ELA 2009
Actinopterygii (Bony fish)	Poeciliidae	*Gambusia*	*holbrooki*	Eastern Mosquito Fish	Exotic	x	
Amphibia	Hylidae	*Litoria*	*fallax*	Eastern Dwarf Tree Frog	Native	x	
	Hylidae	*Litoria*	*peronii*	Peron's (Brown) Tree Frog	Native		x
	Myobatrachidae	*Crinia*	*signifera*	Common Eastern Froglet	Native	x	
	Myobatrachidae	*Limnodynastes*	*peronii*	Striped Marshfrog	Native	x	
	Myobatrachidae	*Uperoleia*	*laevigata*	Smooth Toadlet	Native	x	
Aves	Acanthizidae	*Acanthiza*	*lineata*	Striated Thornbill	Native		x
	Acanthizidae	*Acanthiza*	*nana*	Yellow Thornbill	Native	x	
	Acanthizidae	*Smicrornis*	*brevirostris*	Weebill	Native	x	
	Acanthizidae (Pardalotidae)	*Pardalotus*	*striatus*	Striated Pardalote	Native	x	
	Accipitridae	*Elanus*	*axillaris*	Black-shouldered Kite	Native		x
	Ardeidae	***Ardea***	***ibis***	**Cattle Egret**	**Native**	**x**	
	Artamidae	*Gymnorhina*	*tibicen*	Australian Magpie	Native	x	
	Cacatuidae	*Cacatua*	*galerita*	Sulphur-crested Cockatoo	Native	x	
	Cacatuidae	*Eolophus*	*roseicapillus*	Galah	Native	x	x
	Campephagidae	*Coracina*	*novaehollandiae*	Black-faced Cuckoo-shrike	Native	x	x
	Charadriidae	*Vanellus*	*miles*	Masked Lapwing	Native		x
	Columbidae	*Ocyphaps*	*lophotes*	Crested Pigeon	Exotic	x	
	Columbidae	*Streptopelia*	*turtur*	Turtle Dove	Exotic	x	
	Corvidae	*Corvus*	*coronoides*	Australian Raven	Native	x	
	Corvidae	*Corvus*	*mellori*	Little Raven	Native	x	x
	Estrildidae	***Stagonopleura***	***guttata***	**Diamond Firetail**	**Native**	**Pot.**	
	Hirundinidae	*Hirundo*	*neoxena*	Welcome Swallow	Native		x
	Hirundinidae	*Hirundo*	*nigricans*	Tree Martin	Native		x
	Maluridae	*Malurus*	*cyaneus*	Superb Fairywren	Native	x	x
	Meliphagidae	*Lichenostomus*	*penicillata*	White-plumed Honeyeater	Native		x
	Meliphagidae	*Manorina*	*melanocephala*	Noisy Miner	Native	x	x
	Meliphagidae	*Meliphaga*	*lewinii*	Lewin's Honeyeater	Native	x	
	Monarchidae	*Grallina*	*cyanoleuca*	Magpie-lark	Native	x	x
	Motacillidae	*Motacilla*	*cinerea*	Grey Wagtail	Native	x	
	Pachycephalidae	*Colluricincla*	*harmonica*	Grey Shrike-thrush	Native	x	
	Petroicidae	*Eopsaltria*	*australis*	Eastern Yellow Robin	Native	x	

Class	Family	Genus	Species	Common name	Native/Exotic	ELA 2012	ELA 2009	
	Psittacidae	*Platycercus*	*eximius*	Eastern Rosella	Native	x	x	
	Psittacidae	*Psephotus*	*haematonotus*	Red-rumped Parrot	Native		x	
	Psittacidae	*Trichoglossus*	*haematodus*	Rainbow Lorikeet	Native	x		
	Rhipiduridae	*Rhipidura*	*albiscapa*	Grey Fantail	Native		x	
	Rhipiduridae	*Rhipidura*	*leucophrys*	Willy Wagtail	Native	x		
	Scolopacidae	***Gallinago***	***hardwickii***	**Latham's (Japanese) Snipe**	**Native**		**x**	
	Sturnidae	*Acridotheres*	*tristis*	Common Myna	Exotic	x		
	Sturnidae	*Sturnus*	*vulgaris*	Common Starling	Exotic	x		
	Threskiornithidae	*Threskiornis*	*molucca*	Australian White Ibis	Native	x		
	Threskiornithidae	*Threskiornis*	*spinicollis*	Straw-necked Ibis	Native		x	
Mammalia	Canidae	*Canis*	*lupus familiaris*	Domestic Dog	Exotic	x		
	Canidae	*Vulpes*	*vulpes*	European Red Fox	Exotic	x		
	Equidae	*Equus*	*ferus* subsp. *caballus*	Horse	Exotic	x		
Mammalia (Chiroptera)	**Miniopteridae**	***Miniopterus***	***schreibersii oceansis***	**Eastern Bentwing Bat**	**Native**	**x**		
	Molossidae	*Austronomus*	*australis*	White-striped Freetail Bat	Native	x		
	Molossidae	***Mormopterus***	***norfolkensis***	**Eastern Freetail Bat**	**Native**	**x**		
	Molossidae	Mormopterus	sp. 2		Native	x		
	Vespertilionidae	*Chalinolobus*	*gouldii*	Gould's Wattled Bat	Native	x		
	Vespertilionidae	***Falsistrellus***	***tasmaniensis***	**Eastern False Pipistrelle**	**Native**	**x**		
	Vespertilionidae	Nyctophilus	sp.	South-eastern long-eared Bat	Native	x		
	Vespertilionidae	*Vespadelus*	*vulturnus*	Little Forest Bat	Native	x		**Total species 2009/11**
Reptilia	Scincidae	*Lampropholis*	*delicata*	Delicate Garden Skink	Native	x		
					Amphibians	4	1	5
					Aves	26	17	36
					Fish	1	0	1
					Mammals	11	0	11
					Reptiles	1	0	1
					Total species	38	18	48

* Species highlighted in **bold** are threatened species listed under NSW TSC Act or the Commonwealth EPBC Act

Appendix C: Anabat Analysis

Anabat Results: Eastern Creek, 13 Anabat nights over 5 nights 3 & 4th, 20, 21, 22 and 24th April 2012.

Anabat Results Analysed by Peter Knock, Ecologist, Eco Logical Australia

Bat calls were analysed using the program AnalookW (Version 3.7w 31 December 2009, written by Chris Corben, www.hoarybat.com). Call identifications were made using regional based guides to the echolocation calls of microbats in New South Wales (Pennay et al. 2004); and south-east Queensland and north-east New South Wales (Reinhold et al. 2001) and the accompanying reference library of over 200 calls from north-eastern NSW (http://www.forest.nsw.gov.au/research/bats/default.asp).

Bat calls are analysed using species-specific parameters of the call profile such as call shape, characteristic frequency, initial slope and time between calls (Rinehold et al. 2001). To ensure reliable and accurate results the following protocols (adapted from Lloyd et. al. 2006) were followed:

1. Recordings containing less than three pulses were not analysed (Law et al. 1999) and are labelled as short.
2. Only search phase calls were analysed (McKenzie et al. 2002).
3. Four categories of confidence in species identification were used (Mills et al. 1996):
    a. definite – identity not in doubt
    b. probable – low probability of confusion with species of similar calls
    c. possible – medium to high probability of confusion with species with similar calls; and
    d. unidentifiable – calls made by bats which cannot be identified to even a species group.
4. *Nyctophilus spp*. are difficult to identify confidently from their calls and no attempt was made to identify this genus to species level (Pennay et al. 2004).
5. Calls not attributed to microbat echolocation calls are labelled as junk or non-bat calls and don't represent microbat activity at the site. Calls labelled as low are of poor quality and therefore not able to be identified to any microbat species, they can however be used as an indicator of microbat activity at a site.

The calls of *Miniopterus schreibersii oceanensis* can often display very similar characteristics to other species such as *Vespadelus darlingtonii, Vespadelus regulus* and *Vespadelus vulturnus*. Calls of *M. schreibersii oceanensis* were distinguished by the irregular pulse shape and time between calls, lack of an up-sweeping tail and drop in frequency of the pre-characteristic section of more than 2kHz.

The calls of *Myotis macropus* are very similar to Nyctophilus species and it is often difficult to separate these species. Calls were identified as *M.macropus* when the time between calls (TBC) was lower than 75ms and the initial slope (OPS) was greater than 400. Calls were identified as Nyctophilus when the TBC was greater than 95ms and the OPS was lower than 300. If they can't be distinguished they are given a combined species label.

Anabat results were variable between nights and across all sites with generally very low number of bat passes for the amount of survey effort completed. Some sites also recorded a high degree of non bat calls or "junk noise" that can be caused by a range of factors from environmental such as wind and rain to artificial such as electrical interference from power sources.

Overall from all recording sites, 8 species / groups were identified including **3 vulnerable** species listed under the NSW TSC Act 1995. They were **Eastern Bentwing (*Miniopterus schreibersii oceanensis),* East Coast *Freetail (Mormopterus norfolkensis*)** and **Eastern False Pipistrelle** (***Falsistrellus tasmaniensis)*** in order of prevalence.

The **East Coast Freetail** and **Eastern False Pipistrelle** were recorded from only 4 call sequences and only in the lower confidence range that of possible and probable call attributes. The most prevalent threatened species recorded from a greater number of sites was that of the Eastern Bentwing. By far the most common species were Gould's Wattled Bat (*Chalinolobus gouldii)* and Little Forest Bat *(Vespadelus vulturnus)* but again a low overall presence represented by microbat passes at the site.

Table 14 shows results from each Anabat recorder for each night, a representative call profile image of each species follows the table.

Table 14: Anabat Results from the Eastern Creek Business Hub Site

ANABAT RECORDER NUMBER: EC_CITY2		RECORDING CLASSIFICATIONS			
Night	**Label**	**Number**	**Definite**	**Probable**	**Possible**
3/04/2012	*Chalinolobus gouldii*	4	3	1	0
3/04/2012	*Miniopterus schreibersii oceanensis*	1	0	0	1
3/04/2012	*Mormopterus norfolkensis*	1	0	1	0
3/04/2012	low	15			
3/04/2012	short	10			
3/04/2012	junk	79			
4/04/2012	*Chalinolobus gouldii*	3	3	0	0
4/04/2012	*Miniopterus schreibersii oceanensis*	2	1	0	1
4/04/2012	*Mormopterus norfolkensis*	2	0	0	2
4/04/2012	*Mormopterus sp2*	1	0	1	0
4/04/2012	*Nyctophilus sp*	1	1	0	0
4/04/2012	low	7			
4/04/2012	short	2			
4/04/2012	junk	58			

20/04/2012	*Falsistrellus tasmaniensis*	1	0	0	1
20/04/2012	*Vespadelus vulturnus*	48	43	5	0
20/04/2012	low	10			
20/04/2012	short	6			
20/04/2012	junk	106			
ANABAT RECORDER NUMBER: EC_CITY3		RECORDING CLASSIFICATIONS			
Night	**Label**	**Number**	**Definite**	**Probable**	**Possible**
3/04/2012	*Chalinolobus gouldii*	1	1	0	0
3/04/2012	*Miniopterus schreibersii oceanensis*	4	2	2	0
3/04/2012	short	1			
3/04/2012	low	0			
3/04/2012	junk	4			
20/04/2012	short	3			
20/04/2012	junk	9			
21/04/2012	*Chalinolobus gouldii*	2	2	0	0
21/04/2012	*Miniopterus schreibersii oceanensis*	1	0	1	0
21/04/2012	*Tadarida australis*	1	1	0	0
21/04/2012	low	1			
21/04/2012	short	4			
21/04/2012	junk	11			
22/04/2012	low	1			
22/04/2012	short	3			
22/04/2012	junk	7			
23/04/2012	low	1			
23/04/2012	junk	6			
ANABAT RECORDER NUMBER: EC_SUTH2		RECORDING CLASSIFICATIONS			
Night	**Label**	**Number**	**Definite**	**Probable**	**Possible**

4/04/2012	*Tadarida australis*	1	1	0	0
4/04/2012	junk	1086			
20/04/2012	*Tadarida australis*	1	1	0	0
20/04/2012	junk	2			
ANABAT RECORDER NUMBER: EC_SUTH0		RECORDING CLASSIFICATIONS			
Night	**Label**	**Number**	**Definite**	**Probable**	**Possible**
3/04/2012	*Chalinolobus gouldii*	10	9	1	0
3/04/2012	*Miniopterus schreibersii oceanensis*	16	13	3	0
3/04/2012	*Mormopterus sp2*	2	2	0	0
3/04/2012	*Nyctophilus sp*	4	4	0	0
3/04/2012	*Vespadelus vulturnus*	1	0	0	1
3/04/2012	low	8			
3/04/2012	short	23			
3/04/2012	junk	1028			
4/04/2012	*Chalinolobus gouldii*	4	3	1	0
4/04/2012	*Miniopterus schreibersii oceanensis*	5	2	2	1
4/04/2012	*Nyctophilus sp*	2	2	0	0
4/04/2012	low	9			
4/04/2012	short	8			
4/04/2012	junk	2224			
20/04/2012	low	3			
20/04/2012	junk	273			

Threatened species highlighted in green

Figures 13 - 20 are representative call profiles for the various bat species recorded on the Eastern Creeks Business Hub site.

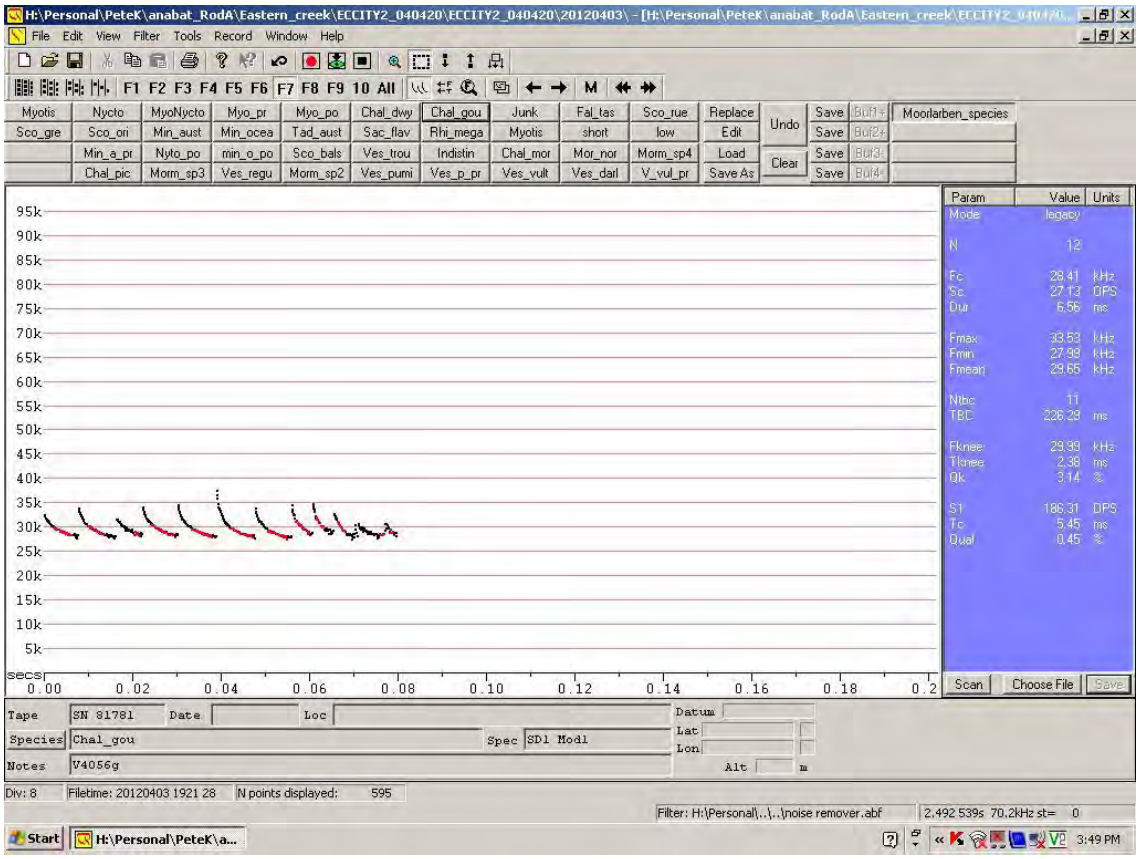

Figure 21: Call Profile for Chalinolobus gouldii recorded at Eastern Creek, 3 April 2012

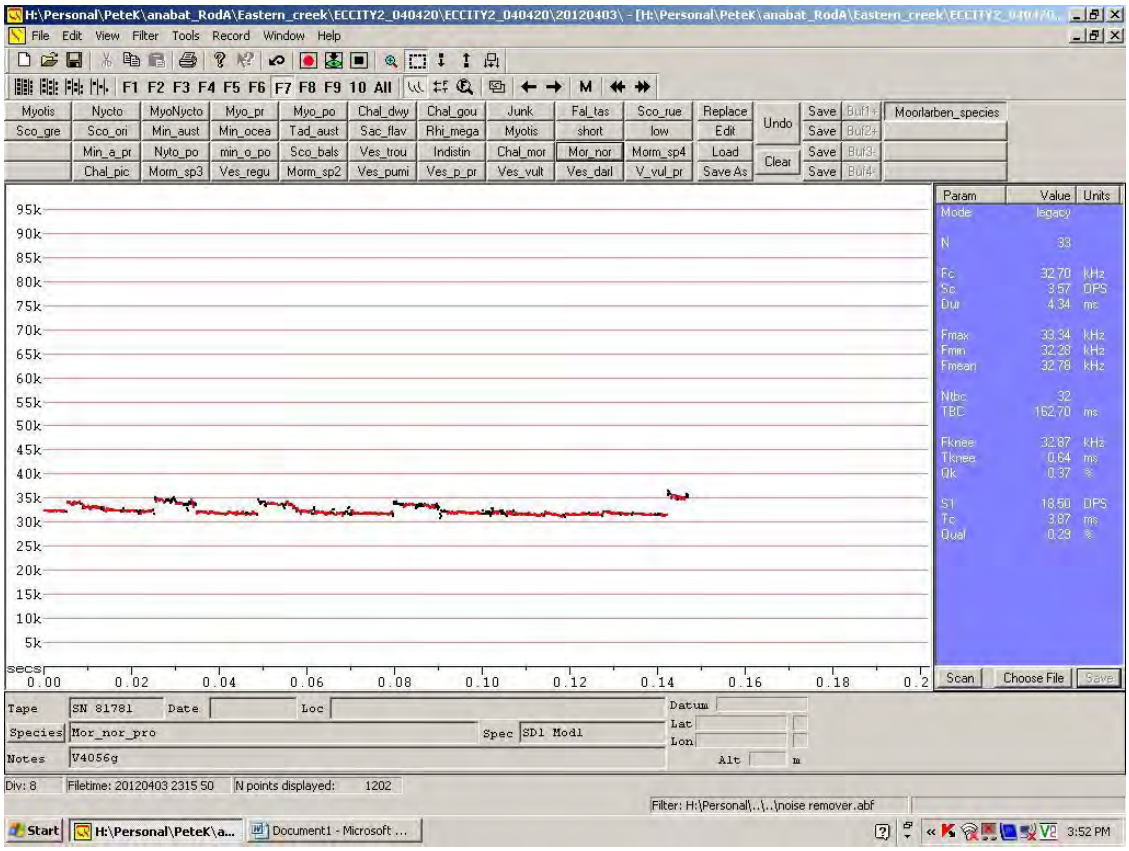

Figure 22: Call Profile for *Mormopterus norfolkensis* recorded at Eastern Creek, 3 April 2012

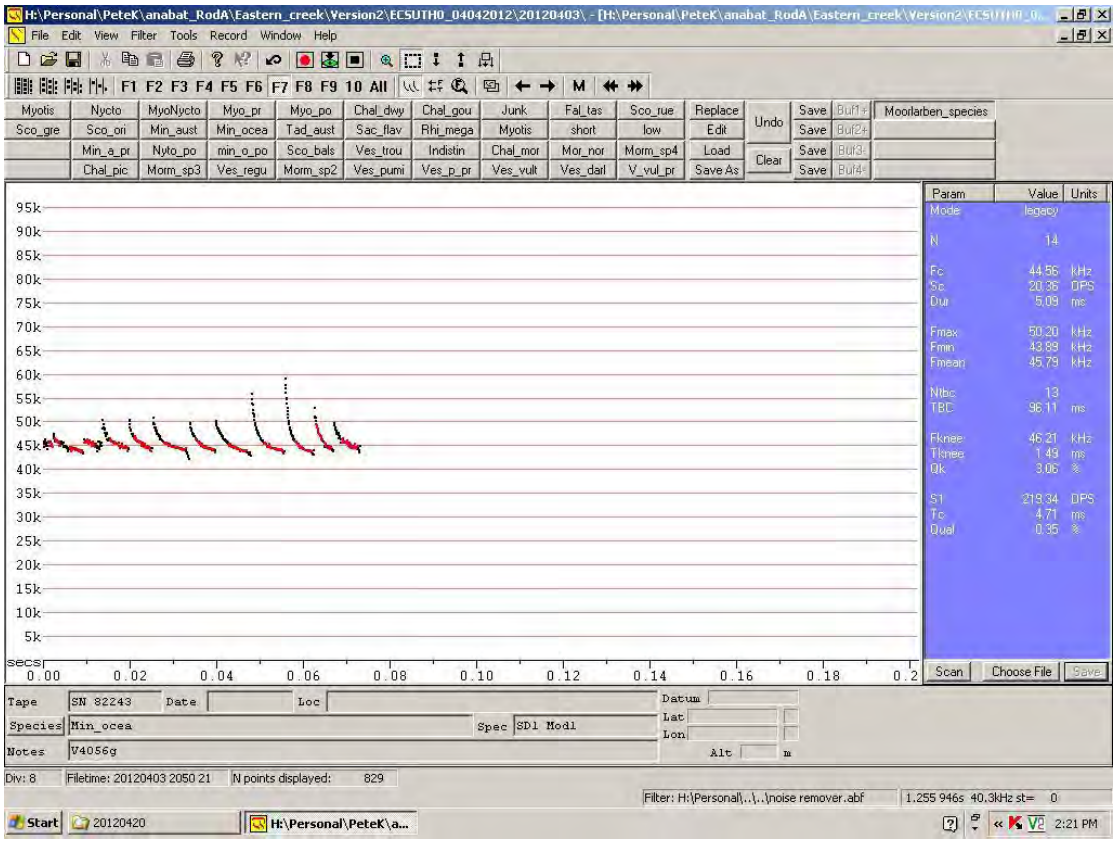

Figure 23: Call profile for Miniopterus schreibersii oceanensis recorded at Eastern Creek, 3 April 2012

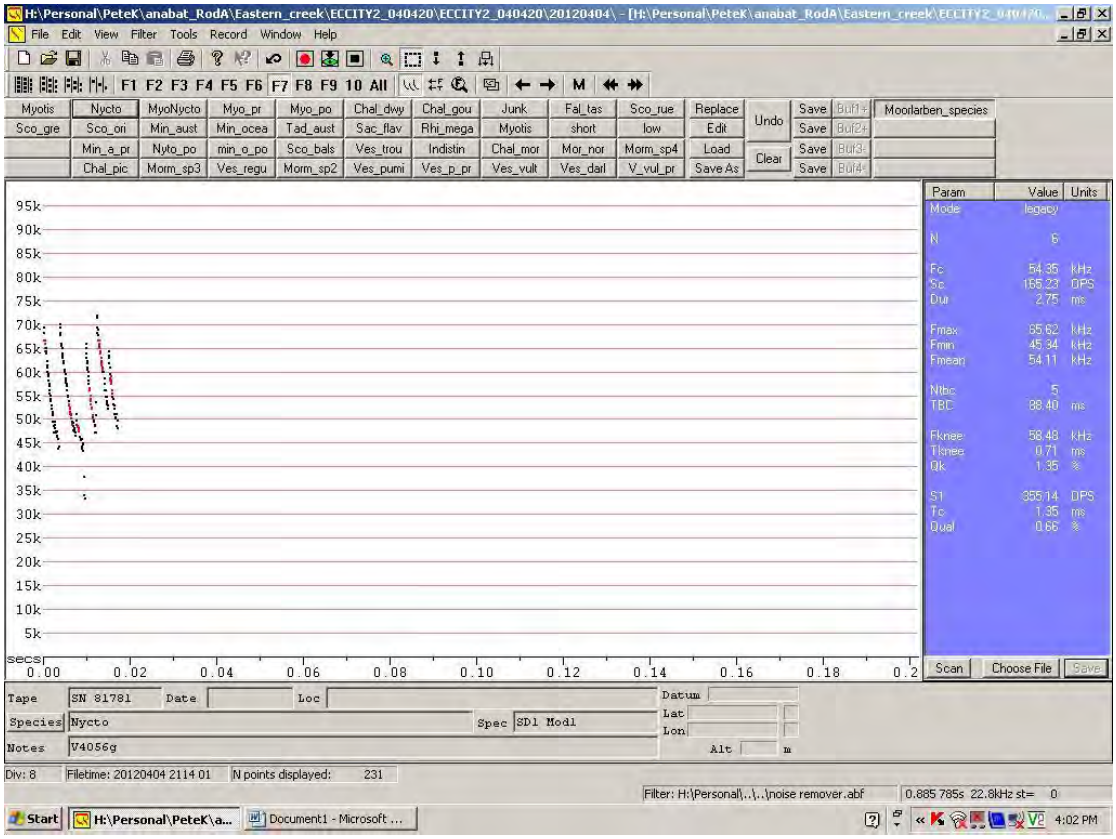

Figure 24: Call profile for Nyctophilus species recorded at Eastern Creek, 4 April 2012

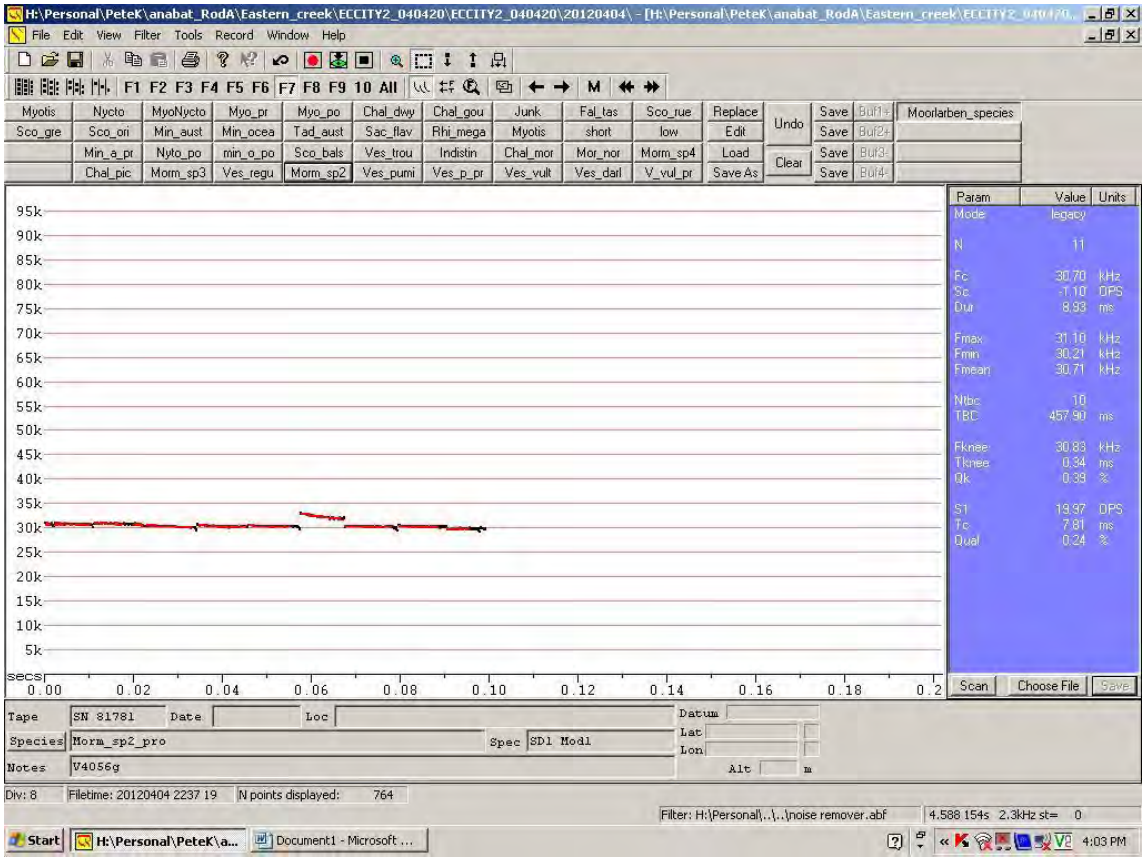

Figure 25: Call Profile for Mormopterus species 2 recorded at Eastern Creek, 4 April 2012

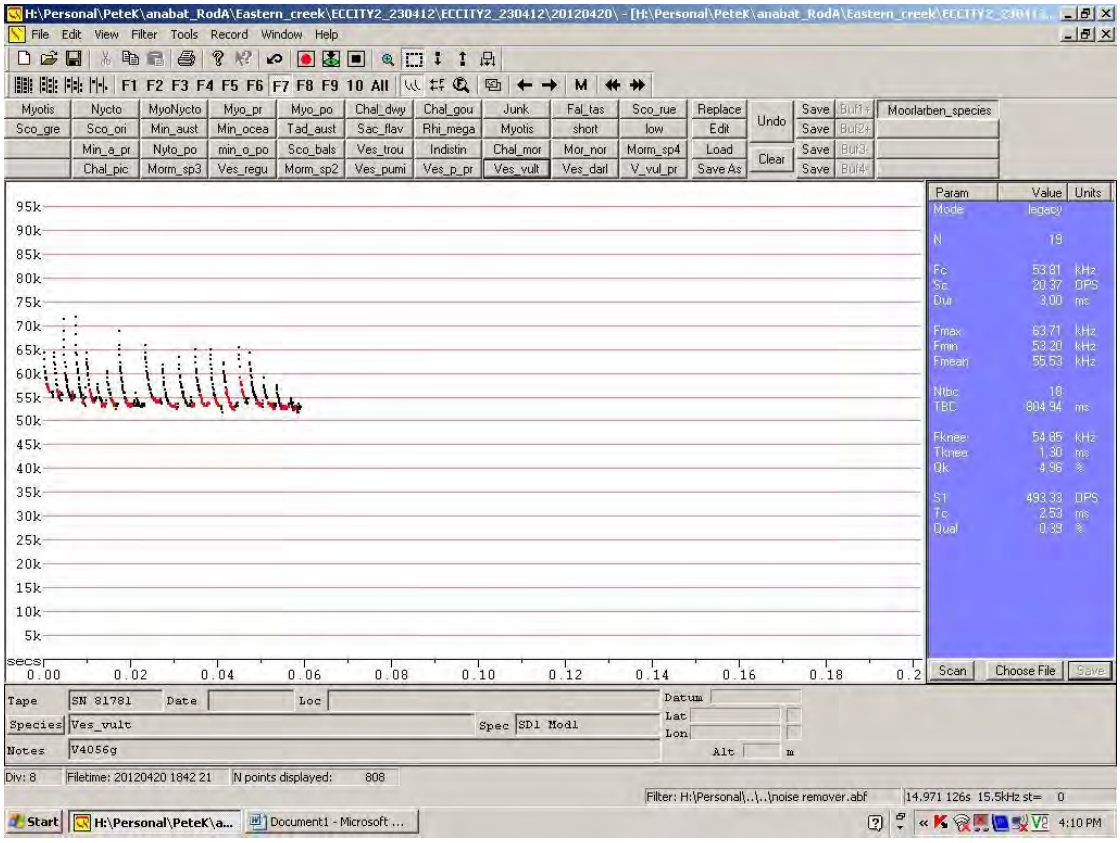

Figure 26: Call Profile for Vespadelus vulternus recorded at Eastern Creek, 20 April 2012

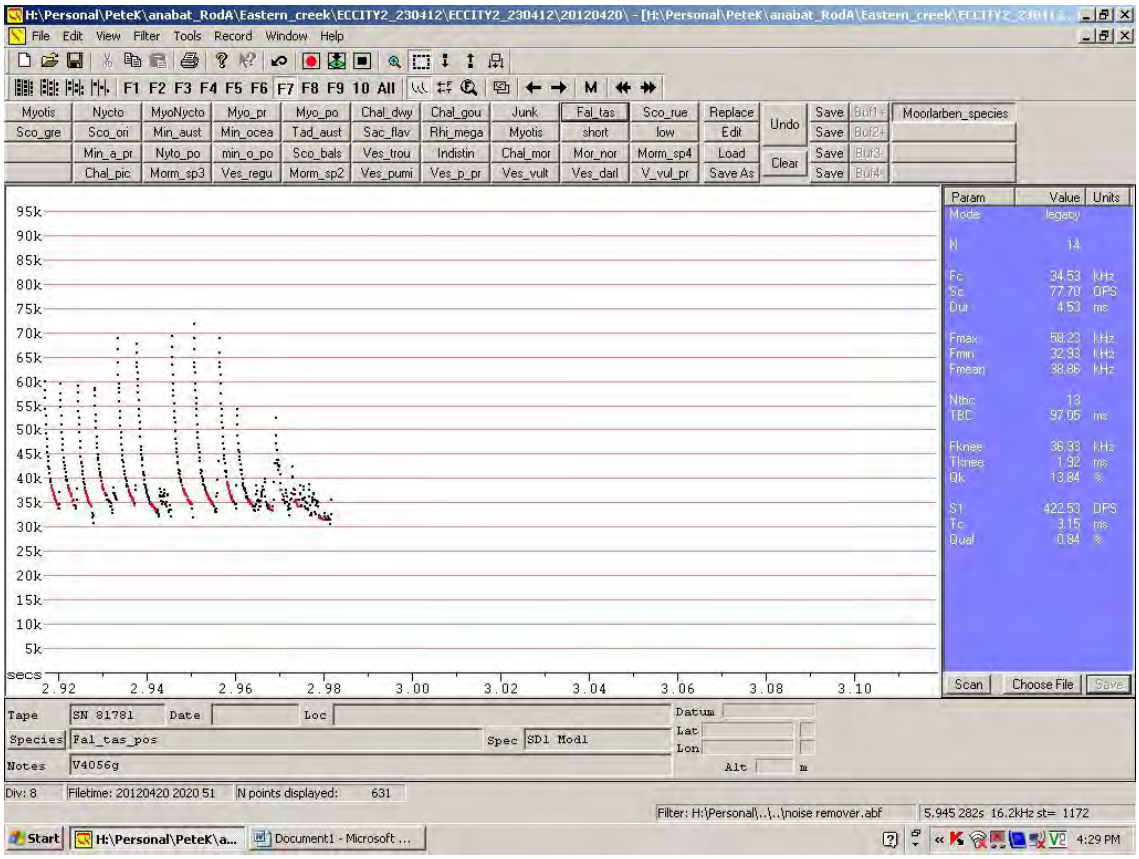

Figure 27: Call profile for Falsistrellus tasmaniensis recorded at Eastern Creel, 20 April 2012

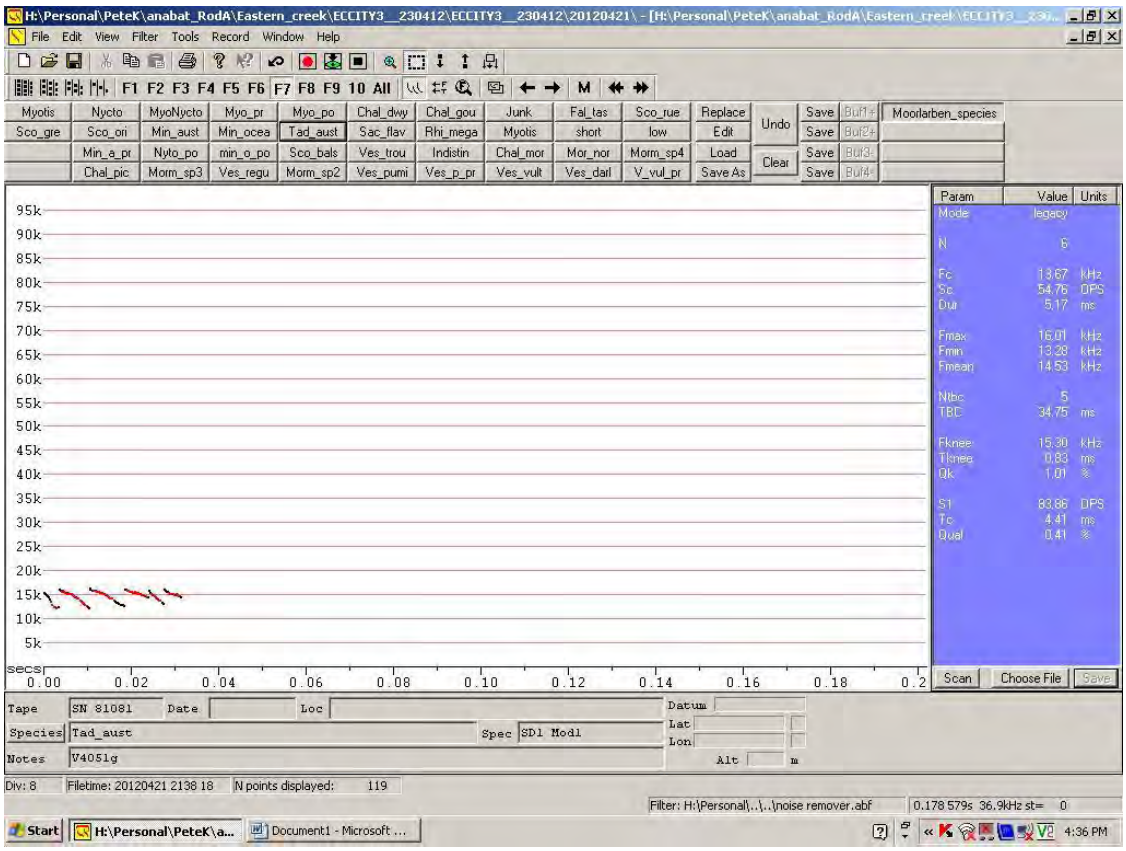

Figure 28: Call profile for Tadarida australis recorded at Eastern Creek, 21 April 2012

Appendix D: Impact Assessments (TSC Act listed species)

An assessment of the impacts of the proposal on species, populations and ecological communities listed under Schedules 1 and 2 of the TSC Act has been completed. The Project will be assessed under Part 4.1 of the EP&A Act (provisions for SSD) and consequently this impact assessment was undertaken in accordance with the *Guidelines for threatened species assessment* (DEC and DPI 2005).

The study area supports areas of native vegetation including EECs and potential and known habitat for a number of threatened fauna species. A full list of species recorded within a 10 km radius of the study area is found in Appendix A; however, not all of these species or their habitat are likely to be impacted. Potentially impacted species are listed below. Each flora and fauna species has been assessed for potential impacts that may result.

Critically Endangered Ecological Communities

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River Flat Eucalypt Forest (Alluvial Woodland sub-community)

Threatened Fauna

Bats

- *Miniopterus schreibersii oceanensis* (Eastern Bent-wing-bat)
- *Mormopterus norfolkensis* (East Coast Free-tail Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)

Birds

- *Stagonopleura guttata* (Diamond Firetail)

Cumberland Plain Woodland

Cumberland Plain Woodland is an Endangered Ecological Community (EEC) occurring on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, CPW was extensive across the Cumberland Plain, Western Sydney. DECC (2008f) estimated that only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain.

Shale Plains Woodland and Shale Hills Woodland are the two sub-communities of Cumberland Plain Woodland. Shale hills woodland occurs mainly on the elevated and sloping southern half of the Cumberland Plain whilst Shale plains woodland is the most widely distributed form of Cumberland Plain Woodland (NSW NPWS 2002).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Not applicable – CPW is not a threatened species and/or population

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal will result in the permanent removal of 1.93 ha of CPW. The clearing of the vegetation within the subject site consists of a canopy dominated by Forest Red Gum (*Eucalyptus tereticornis*), with scattered occurrences of Grey Box (*Eucalyptus moluccana*) and Cabbage Gum (*Eucalyptus amplifolia*). The shrub layer over large parts of the study area has been and is currently subject to grazing (horses). Native Blackthorn (*Bursaria spinosa* subsp. *spinosa*) is the most common shrub layer species throughout the study area, with the exotic shrub Paddy's Lucerne (*Sida rhombifolia*) dominating to co-dominating throughout the CPW.

Groundcover vegetation is typically dominated by a mixture of native and exotic grasses and herbs. Native groundcover was mostly dominated by the native grasses Paddock Lovegrass (Eragrostis leptostachya), Weeping Rye Grass (*Microlaena stipoides*), and the exotic Panic Veldt Grass (Ehrharta erecta), *Setaria parviflora*, with the native herb Kidney Weed (*Dichondra repens*), and the exotic Greater Beggars Ticks (*Bidens subalternans*) and Fleabane (*Conyza* spp.).

The CPW at the subject site is found in a highly stressed state, suffering from severe psyllid induced dieback, which has likely been exacerbated by years of drought followed recent heavy rains and consequent waterlogging. In particular the north eastern remnant is currently enduring semi-permanent inundation due to restricted drainage from the site under the M7 Motorway.

Despite the clearance of CPW, extensive areas of CPW will remain in the study area (3.24 ha) and protected under a Biobanking Agreement at Chandos West, as outlined in Section 6. Management measures include an Operational Environmental Management Plan, Soil and Water Management Plan and a an additional (future) Biobanking Agreement will be implemented to prevent degradation to surrounding of CPW due to sedimentation, edge effects and weed invasion.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Not applicable – CPW is not a threatened species and/or population

How is the proposal likely to affect current disturbance regimes?

Parts of the study area are highly disturbed due to previous agricultural and residential development uses of the site with a school that previously existed in the south-west section of the study area. The site is also influenced by the adjacent urban development such as the M7 Westlink Motorway and residential housing. Current disturbance at the site includes weed invasion, soil disturbance and currently subject to grazing by horses. The site is also heavily inundated by storm water run-off and waterlogging from poor drainage underneath the M7 motorway.

The proposal will remove current grazing impacts at the site and will improve the drainage at site through Water Sensitive Urban Design, the introduction of a large water detention basin and improved drainage from the site.

How is the proposal likely to affect habitat connectivity?

The study area is currently bounded by Church St to the north, Great Western Highway to the south, M7 Westlink Motorway to the East and Rooty Hill South Rd to the West.

The habitat patches present on site are currently somewhat distinct from each other, separated by stretches of open exotic grassland. Clearance of the 1.93 ha of CPW vegetation will not cause further fragmentation of vegetation and habitat onsite.

A larger stand of similar vegetation exists to the north in Morreau Reserve and in the Western Sydney Parklands. Currently these stands of vegetation are bounded by residential development and roads. Therefore the proposed development is unlikely to affect current habitat connectivity to the other stands of vegetation.

The restoration works proposed for the eastern half of the study area will improve, habitat connectivity to the existing bushland located in Morreau Reserve to the North and provide a larger, more intact area of habitat.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat has not been declared for this community.

***Miniopterus schreibersii oceanensis* (Eastern Bent-wing-bat)**

The Eastern Bentwing Bat is listed as a vulnerable species under the TSC Act. The species has recently been revised to *Miniopterus orianae oceanensis* (Churchill 2008), recognising the subspecies to full species status. Eastern Bentwing Bat occupies a range of forested environments (including wet and dry sclerophyll forests, monsoon forest, open woodland, *Melaleuca* forests and open grasslands) along the coastal portion of eastern Australia, from Cape York in north Queensland to Castlemaine in Victoria. It occurs mainly east of the Great Dividing Range (Churchill 2008).

This species has a fast, level flight exhibiting swift shallow dives. It forages from just above the tree canopy, to many times the canopy height in forested areas, and will utilise open areas where it is known to forage at lower levels. It can travel up to 65 km in one night. Moths appear to be the main dietary component, with other prey items including flies, cockroaches and beetles (Churchill 2008, OEH 2012).

This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though individuals often use numerous roosts, it congregates in large numbers at a small number of nursery caves to breed and hibernate (breeding or roosting colonies can number from 100 to 150,000 individuals). Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows. This species occupies a number of roosts within specific territorial ranges usually within 300 km of the maternity cave, and may travel large distances between roost sites (OEH 2012).

The Eastern Bent-wing Bat is threatened by a number of processes including loss of foraging habitat, damage to or disturbance of roosting caves (particularly during winter or breeding), application of pesticides in or adjacent to foraging areas, and predation by feral cats and foxes.

The Eastern Bentwing Bat was recorded via Anabat within the subject site during the field survey.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The proposal could impact on the life cycle of the Eastern Bentwing Bat by reducing the amount of foraging habitat available to the species and degrading their habitat (e.g. through fragmentation). The proposal would not impact on the breeding habitat of the Eastern Bentwing Bat given the species breeds in maternity caves away from the study area.

The proposal will not significantly fragment the habitat of the species, which is highly mobile given that this species travels large distances while foraging and migrating (the species can travel up to 65 km in one night and will travel several hundred kilometres to over-wintering roosts). Also, given habitat is widely spread across the project site, it is unlikely that the proposed works would lead to the displacement of any individuals.

The species is also known to be attracted to lights and has been recorded foraging for insects around street lights.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Vegetation representing foraging habitat for the Eastern Bentwing Bat on site are currently located in the north-east, north-west and central portion of the site and are separated from each other by patches of open, exotic-dominated grassland.

The proposal would not impact on preferred roosting or breeding habitat for the species (caves, culverts). The removal of habitat trees, including trees with hollows (potential roosting, but not preferred roosting habitat), will be avoided where possible. However, where the removal of habitat trees is required, a pre-clearance protocol will be developed and implemented to determine if roosts are present in any trees proposed for clearing. An ecologist should be present during clearing to capture and re-release individuals (where appropriate).

The Eastern Bentwing Bat is also highly mobile and would be able to access foraging resources in the locality.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Eastern Bentwing Bat occurs along the east coast of Australia, mainly east of the Great Dividing Range (Churchill 2008). Thus the subject site does not represent the limit of this species' distribution.

How is the proposal likely to affect current disturbance regimes?

Parts of the study area are highly disturbed due to previous agricultural and development uses of the site with a school that use to exist in the south-west section of the study area. The site is also influenced by the adjacent urban development such as the M7 Westlink Motorway and residential housing. Current disturbance at the site includes weed invasion, soil disturbance and currently subject to grazing by horses.

Threats to the Eastern Bentwing Bat include poisoning from pesticides (OEH 2011). It is unlikely that any pesticides used in feral animal management will impact on the species given insect control is unlikely to be required. The application of herbicides should be restricted when alternative methods are available.

How is the proposal likely to affect habitat connectivity?

The study area is currently bounded by Church St to the north, Great Western Highway to the south, M7 Westlink Motorway to the East and Rooty Hill South Rd to the West.

The habitat patches present on site are currently somewhat distinct from each other, separated by stretches of open exotic grassland. Clearance of the 1.93 ha of SPW will not cause further fragmentation of vegetation and habitat onsite.

It is unlikely that the proposal would create barriers to movement of Eastern Bentwing Bat throughout the project site, which is highly mobile. Alternative habitat is available in the surrounding study area. Therefore the proposed development is unlikely to affect current habitat connectivity to other habitat available in the study area.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Mormopterus norfolkensis* (Eastern Freetail Bat)**

Eastern Freetail-bat is listed as a vulnerable species in NSW under the TSC Act. It is found along the east coast from south Queensland to southern NSW. The species occurs in dry sclerophyll forest and woodland east of the Great Dividing Range (OEH 2012).

The Eastern Freetail-bat roosts mainly in tree hollows but would also roost under bark or in man-made structures. The species is solitary and probably insectivorous (OEH 2012).

Threats to the species include the loss of hollow-bearing trees, loss of foraging habitat and the application of pesticides in or adjacent to foraging areas (OEH 2012).

The Eastern Freetail-bat was recorded via Anabat within the subject site during the field survey.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The proposal could impact on the life cycle of the Eastern Freetail-bat by reducing the amount of foraging habitat available to the species and degrading their habitat (eg. through fragmentation). The proposal has the potential to impact on this species roosting habitat through the removal of hollow-bearing trees.

The proposal will not significantly fragment the habitat of the species, which is highly mobile. Also, given habitat is widely spread across the project site, it is unlikely that the proposed works would lead to the displacement of any individuals.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Vegetation representing foraging habitat for the Eastern Freetail-bat will be removed

The proposal has the potential to impact on preferred roosting or breeding habitat for the species through the removal of hollow-bearing trees. These trees should be avoided where possible. However, where the removal of habitat trees is required, a pre-clearance protocol should be developed and implemented to determine if roosts are present in any trees proposed for clearing. An ecologist should be present during clearing to capture and re-release individuals (where appropriate).

The Eastern Freetail-bat is also highly mobile and would be able to access foraging resources in the locality.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Eastern Freetail-bat occurs east of the Great Dividing range to the coastline, and ranging in latitude from Picton (New South Wales) in the south, as far north as south-east Queensland. Most recent records come from north-eastern New South Wales (DSEWPAC 2011). Thus the subject site does not represent the limit of this species' distribution.

How is the proposal likely to affect current disturbance regimes?

Parts of the study area are highly disturbed due to previous agricultural and development uses of the site with a school that use to exist in the south-west section of the study area. The site is also influenced by the adjacent urban development such as the M7 Westlink Motorway and residential housing. Current disturbance at the site includes weed invasion, soil disturbance and currently subject to grazing by horses.

Threats to the Eastern Freetail-bat include poisoning from pesticides (OEH 2011). It is unlikely that any pesticides used in feral animal management will impact on the species given insect control is unlikely to be required. The application of herbicides should be restricted when alternative methods are available.

How is the proposal likely to affect habitat connectivity?

The study area is currently bounded by Church St to the north, Great Western Highway to the south, M7 Westlink Motorway to the East and Rooty Hill South Rd to the West.

The habitat patches present on site are currently somewhat distinct from each other, separated by stretches of open exotic grassland. Clearance of the 1.93ha of SPW will not cause further fragmentation of vegetation and habitat onsite.

It is unlikely that the proposal would create barriers to movement of Eastern Freetail-bat throughout the project site, which is highly mobile. Alternative habitat is available in the surrounding study area. Therefore the proposed development is unlikely to affect current habitat connectivity to other habitat available in the study area.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Falsistrellus tasmaniensis* (Eastern False Pipistrelle)**

The Eastern False Pipistrelle is listed as vulnerable under Schedule 2 of the NSW *Threatened Species Conservation Act* 1995. The species is wide-ranging, occurring along the southeast coast of Australia with records from South East Queensland, New South Wales, Victoria and Tasmania.

The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20 m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies, but the species has been recorded roosting in caves under loose bark and occasionally in old wooden buildings (Churchill 1998). Their flight pattern is high and fast and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants.

This species is threatened by a number of processes including loss of trees for foraging and hollow-bearing trees for roosting, disturbance to winter roosting and breeding sites, and application of pesticides in or adjacent to foraging areas (DECC 2005).

The Eastern False Pipistrelle was recorded via Anabat within the subject site during the field survey.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The proposal could impact on the life cycle of the Eastern False Pipistrelle by reducing the amount of foraging habitat available to the species and degrading their habitat (eg. through fragmentation). The proposal has the potential to impact on this species roosting habitat through the removal of hollow-bearing trees.

The proposal will not significantly fragment the habitat of the species, which is highly mobile. Also, given habitat is widely spread across the project site, it is unlikely that the proposed works would lead to the displacement of any individuals.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Vegetation representing foraging habitat for the Eastern False Pipistrelle will be removed

The proposal has the potential to impact on preferred roosting or breeding habitat for the species through the removal of hollow-bearing trees (HBT). These trees should be avoided where possible, with 3 of five (5) HBT's proposed to be retained within the BOA. However, where the removal of habitat trees is required, a pre-clearance protocol will be developed and implemented to determine if roosts are present in any trees proposed for clearing. An ecologist should be present during clearing to capture and re-release individuals (where appropriate).

The Eastern False Pipistrelle is also highly mobile and would be able to access foraging resources in the locality.

The proposal may increase erosion, sedimentation and runoff through the clearing of vegetation and the construction of roads, and produce conditions favourable to weed invasion impacting on the species' habitat

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Eastern False Pipistrelle occurs along the southeast coast of Australia with records from South East Queensland, New South Wales, Victoria and Tasmania. Thus the subject site does not represent the limit of this species' distribution.

How is the proposal likely to affect current disturbance regimes?

Parts of the study area are highly disturbed due to previous agricultural and development uses of the site with a school that use to exist in the south-west section of the study area. The site is also influenced by the adjacent urban development such as the M7 Westlink Motorway and residential housing. Current disturbance at the site includes weed invasion, soil disturbance and currently subject to grazing by horses.

The proposal is unlikely to alter the current fire regime at the study area.

Feral animals can have a detrimental impact on Eastern False Pipistrelle habitat. In the case of grassy woodlands, grazing by feral animals such as the European Rabbit can result in loss of species diversity and tussock structure which in turn impacts the presence of insects as a food source for Eastern False Pipistrelle. Feral animals can also have a detrimental impact on Eastern False Pipistrelle directly; predation by cats and foxes is listed as a threat to the species (OEH 2011). However, the proposal is unlikely to contribute to increasing feral animal activity across the project site.

Threats to the Eastern False Pipistrelle include poisoning from pesticides (OEH 2011). It is unlikely that any pesticides used in feral animal management will impact on the species given insect control is unlikely to be required. The application of herbicides should be restricted when alternative methods are available.

How is the proposal likely to affect habitat connectivity?

The study area is currently bounded by Church St to the north, Great Western Highway to the south, M7 Westlink Motorway to the East and Rooty Hill South Rd to the West.

The habitat patches present on site are currently somewhat distinct from each other, separated by stretches of open exotic grassland. Clearance of the 1.93 ha of SPW will not cause further fragmentation of vegetation and habitat onsite.

It is unlikely that the proposal would create barriers to movement of Eastern False Pipistrelle throughout the project site, which is highly mobile. Alternative habitat is available in the surrounding study area. Therefore the proposed development is unlikely to affect current habitat connectivity to other habitat available in the study area.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Appendix E: Impact Assessments (EPBC Act listed species)

Endangered Ecological Communities

- Cumberland Shale Plains Woodland and Shale Gravel Transition Forest in the Sydney Basin

Migratory Birds

- *Gallinago hardwickii* (Latham's Snipe)
- *Ardea ibis* (Cattle Egret)

Cumberland Shale Plains Woodland and Shale Gravel Transition Forest in the Sydney Basin

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

Criterion a: reduce the extent of an ecological community

The proposal will results in the permanent removal of 1.93ha of CPW. The clearing of the vegetation within the subject site consists of a canopy dominated by Forest Red Gum (*Eucalyptus tereticornis*), with scattered occurrences of Grey Box (*Eucalyptus moluccana*) and Narrow-leaved Ironbark (*Eucalyptus crebra*). The shrub layer over large parts of the study area has been and is currently subject to grazing (horses). Native Blackthorn (*Bursaria spinosa* subsp. *spinosa*) is the most common shrub layer species throughout the study area, with the exotic shrub Paddy's Lucerne (*Sida rhombifolia*) dominating to co-dominating throughout the SPW.

Groundcover vegetation is typically dominated by a mixture of native and exotic grasses and herbs. Native groundcover was mostly dominated by the native grasses Paddock Lovegrass (Eragrostis leptostachya), Weeping Rye Grass (*Microlaena stipoides*), and the exotic Panic Veldt Grass (Ehrharta erecta), *Setaria parviflora*, with the native herb Kidney Weed (*Dichondra repens*), and the exotic Greater Beggars Ticks (*Bidens subalternans*) and Fleabane (*Conyza* spp.).

The CPW at the subject site is found in a highly stressed state, suffering from severe psyllid induced dieback, which has likely been exacerbated by years of drought followed recent heavy rains and consequent waterlogging. In particular the north eastern remnant is currently enduring semi-permanent inundation due to restricted drainage from the site under the M7 Motorway.

Despite the clearance of CPW, extensive areas of CPW will remain in the study area (3.32 ha) and within the project area and offsets will be provided for the clearance of CPW within the subject site.

Criterion b: fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The study area is currently bounded by Church St to the north, Great Western Highway to the south, M7 Westlink Motorway to the East and Rooty Hill South Rd to the West.

The habitat patches present on site are currently somewhat distinct from each other, separated by stretches of open exotic grassland. Clearance of the 1.93ha of CPW vegetation will not cause further fragmentation of vegetation and habitat onsite.

A larger stand of similar vegetation exists to the north in Morreau Reserve and in the Western Sydney Parklands. Currently these stands of vegetation are bounded by residential development and roads. Therefore the proposed development is unlikely to affect current habitat connectivity to the other stands of vegetation.

Criterion c: adversely affect habitat critical to the survival of an ecological community

No critical habitat has been declared for this Critically Endangered Ecological Community

Criterion d: modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

At present, stormwater generated both onsite and west of the site is directly through an open, constructed drainage channel running north-east and then north through the site. A significant amount of overland flow appears to occur in the northern portion of the site, currently impacting the remnant CPW vegetation adjacent to the M7 Motorway.

The Business Hub development includes the formalisation of stormwater movement through the site via a piped system in the western portion of the site which will empty into an open channel and stormwater detention basin. The formalisation of stormwater movement and the improvement of water quality through use of the detention basin will reduce a current source of negative environmental impact on the remnant vegetation and increase the potential for successful regeneration and restoration of the areas identified to be used as biodiversity offset sites.

Criterion e: cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The proposal will result in the removal of 1.93 ha of CPW within the project area.

Despite the clearance of CPW, extensive areas of CPW will remain in the study area (3.32 ha) and within the project area and offsets will be provided for the clearance of CPW within the subject site.

The proposed works is unlikely to result in regular burning activities or harvest any flora in the study area.

Criterion f: cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: -- assisting invasive species, that are harmful to the listed ecological community, to become established, or -- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

The proposal will results in the permanent removal of 1.93ha of CPW. The clearing of the vegetation within the subject site consists of a canopy dominated by Forest Red Gum (*Eucalyptus tereticornis*), with scattered occurrences of Grey Box (*Eucalyptus moluccana*) and Narrow-leaved Ironbark (*Eucalyptus crebra*). The shrub layer over large parts of the study area has been and is currently subject to grazing (horses). Native Blackthorn (*Bursaria spinosa* subsp. *spinosa*) is the most common shrub layer species throughout the study area, with the exotic shrub Paddy's Lucerne (*Sida rhombifolia*) dominating to co-dominating throughout the SPW.

Groundcover vegetation is typically dominated by a mixture of native and exotic grasses and herbs. Native groundcover was mostly dominated by the native grasses Paddock Lovegrass (Eragrostis leptostachya), Weeping Rye Grass (*Microlaena stipoides*), and the exotic Panic Veldt Grass (Ehrharta erecta), *Setaria parviflora*, with the native herb Kidney Weed (*Dichondra repens*), and the exotic Greater Beggars Ticks (*Bidens subalternans*) and Fleabane (*Conyza* spp.).

The CPW at the subject site is found in a highly stressed state, suffering from severe psyllid induced dieback, which has likely been exacerbated by years of drought followed recent heavy rains and consequent waterlogging. In particular the north eastern remnant is currently enduring semi-permanent inundation due to restricted drainage from the site under the M7 Motorway.

Criterion g: interfere with the recovery of an ecological community.

CPW is included in the Cumberland Plain Recovery Plan (DECCW 2011). The Recovery Plan has the overall objective of providing for the long-term survival and protection of the threatened biodiversity of the Cumberland Plain. The specific recovery objectives (DECCW 2011) are:

1. *To build a protected area network, comprising public and private lands, focused on the priority conservation lands* [The „priority conservation lands' are 25,566 ha of mapped lands with highest priority for conservation of the Cumberland Plain threatened biodiversity]

2. *To deliver best practice management for threatened biodiversity across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with biodiversity 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 Cumberland Plain Recovery Plan*

4. *To increase knowledge of the threats to the survival of the Cumberland Plain's threatened biodiversity, and thereby improve capacity to manage these in a strategic and effective manner.*

The works do not conflict with the objectives set out in the Recovery Plan. The subject site does not fall within priority conservation lands identified in the Recovery Plan. A number of actions are identified in relation to the above objectives, with action 1.5 the most relevant as it states that *'where impacts on the threatened biodiversity are unavoidable... that offset measures are undertaken within the priority conservation lands where practicable'*. Offsets are proposed as part of this proposal, details of which are contained in **Section 6**.

Cattle Egret (*Ardea ibis*)

The Cattle Egret is listed as a migratory species under the EPBC Act.

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

Criterion a: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;

The Cattle Egret is widespread in Australia, though a relatively recent migrant to Australia. The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. The Cattle Egret has a diverse diet, which includes fish, macroinvertebrates, frogs, lizards, snakes and small birds and mammals.

Cattle Egrets have been recorded within the study area.

Under the proposed development no waterbird habitat will be impacted. No high-value waterbird habit such as mudflats, which represent primary foraging habitat for this species, will be removed. Therefore, the action is unlikely to significant impact on habitat for this species.

Criterion b: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

The project will not result in the establishment of an invasive species that is harmful to the Cattle Egret. To ensure this, a feral animal management plan should be implemented after construction works to prevent any increase in feral animal activity across the site due to development.

Criterion c: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The proposed development will not impact any mudflats, which represent potential breeding and foraging habitat for the Cattle Egret. Therefore, the proposed works should not disrupt the lifecycle of the Cattle Egret.

Latham's Snipe (Gallinago hardwickii)

The Latham Snipe is listed as a migratory species under the EPBC Act.

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

Criterion a: substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;

Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. The Latham's Snipe occurs in a wide variety of permanent and ephemeral wetlands. They usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains (DSEWPAC 2012).

A pair of Latham's Snipes have been recorded within the study area.

Under the proposed development no waterbird habitat will be impacted. No high-value waterbird habit such as wetlands, which represent primary foraging habitat for this species, will be removed. Therefore, the action is unlikely to significant impact on habitat for this species.

Criterion b: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

The project will not result in the establishment of an invasive species that is harmful to the Latham's Snipe. To ensure this, a feral animal management plan should be implemented after construction works to prevent any increase in feral animal activity across the site due to development.

Criterion c: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The proposed development will not impact any wetlands, which represent foraging habitat for the Latham's Snipe. Therefore, the proposed works should not disrupt the lifecycle of the Latham's Snipe.

Appendix F: NSW and Commonwealth Offset principles

1. Impacts must be avoided first by using prevention and mitigation measures.

2. All regulatory requirements must be met.

3. Offsets must never reward ongoing poor performance.

4. Offsets will complement other government programs.

5. Offsets must be underpinned by sound ecological principles.

6. Offsets should aim to result in a net improvement in biodiversity over time.

7. Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.

8. Offsets should be agreed prior to the impact occurring.

9. Offsets must be quantifiable - the impacts and benefits must be reliably estimated.

10. Offsets must be targeted.

11. Offsets must be located appropriately.

12. Offsets must be supplementary.

13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

Commonwealth (CoA 2008 and CoA 2011)

1. Environmental offsets should be targeted to the matter protected by the EPBC Act that is being impacted.
2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.
3. Environmental offsets should deliver a real conservation outcome.
4. Environmental offsets should be developed as a package of actions - which may include both direct and indirect offsets.
5. Environmental offsets should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are „like for like'.
6. Environmental offsets should be located within the same general area as the development

activity.

7. Environmental offsets should be delivered in a timely manner and be long lasting.
8. Environmental offsets should be enforceable, monitored and audited.

The Commonwealth policy identifies two kinds of biodiversity offset, „direct offsets' including such measures as long-term protection of existing habitat, and „indirect offsets' for such measures as implementing recovery plan actions or contributions to relevant research.

Recently the Commonwealth Government has released a consultation draft of the environmental offsets policy under the EPBC Act (CoA 2011), which includes much of the information above but also some key additions and changes relating to offsets policy. The policy focuses on providing high-quality conservation outcomes for matters of NES while also allowing proponents more flexibility to find and secure offsets. The consultation draft of the policy has four main aims, including:

5. Ensuring the efficient, effective, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
6. Providing proponents, the community and other jurisdictions with greater certainty and guidance on how offsets are determined and applied under the EPBC Act;
7. Delivering improved environmental outcomes by consistently applying offsets policy;
8. Explaining the Government's position on a range of issues, including:
    d) When it is appropriate to consider offsets as part of a project;
    e) The appropriate nature and scale of offsets;
    f) The use of market-based instruments for the delivery of offsets.

The proposed offset strategy has been designed to meet the principles of both the NSW and Commonwealth policies.

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