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Appendix F Threatened Biodiversity Habitat Suitability Assessment

Table 1: Threatened Flora Habitat Suitability Assessment

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Acacia bakeri	Marblewood	-	Vulnerable	-	CMA	Restricted to coastal south-east Queensland and north-east NSW, where it occurs north from Mullumbimby. Occurring within or near lowland subtropical rainforest, in adjacent eucalypt forest and in regrowth of both. Usually occurs in the understorey but may occur as a large canopy tree.	This species is considered **unlikely** to occur with the study area.
Acacia jucunda	Yetman Wattle	-	Endangered	-	CMA	Yetman Wattle is found in the Yetman district near the Queensland border on the North West Slopes of NSW. The species is mainly restricted to dry eucalypt woodland communities on sandy to sandy-loam soils.	This species is considered **unlikely** to occur with the study area.
Acacia macnuttiana	MacNutt's Wattle	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Grows in dry forest or woodland and heath vegetation, usually on granite or metasediments and often near streams. It occurs only on the New England Tablelands and North West Slopes. Found in widely scattered locations in the Tenterfield area and west to around Torrington.	This species is considered **likely** to occur within the study area.
Acacia pubifolia	Velvet Wattle	-	Endangered	Vulnerable	Atlas; CMA; PMST	Velvet Wattle generally grows in dry shrubby woodland on granite and metasediment soils. In NSW it is known in the Northern Rivers CMA within the Cataract sub region as well as the Border Rivers/Gwydir CMA within the Binghi Plateau sub region. Both known populations of the species within NSW are approximately 80 and 350 km from the proposed transmission line.	This species is considered **unlikely** to occur with the study area.
Acacia pycnostachya	Bolivia Wattle	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Grows in dry sclerophyll forest amongst granite outcrops, on hillsides at altitudes of 700-900m. Soil types range from sandy and skeletal on exposed outcrops, to shallow sandy loams in less exposed sites. Restricted to NSW where it is known from only three localities on the New England Tablelands; Bolivia Hill and Bluff Rock south of Tenterfield. The locations span a distance of approximately 50 km. The nearest known population occurs approximately 15km from the proposed corridor, around back creek.	This species is considered **unlikely** to occur with the study area.

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Acacia ruppii	Rupp's Wattle	-	Endangered	-	Atlas; CMA	This species occurs in dry open forest and shrubland in sandstone areas, often near creeks and on roadsides. The species occurs at altitudes of 50–150 m in the Banyabba– Coaldale area to the north-west of Grafton, restricted to within 20km of the Banyabba Nature Reserve	This species is considered **unlikely** to occur with the study area.
Acalypha eremorum	Acalypha	-	Endangered	-	CMA	In NSW it occurs in only a few localities, including the Chaelundi, Lismore and Burringbar areas. Within the Northern Rivers CMA is is prodicted to occur in the Clarence Lowlands and Woodenbong sub regions and is known to occur in the Richmond -Tweed sub region. The species occurs in subtropical rainforest, dry rainforest and vine thickets.	This species is considered **likely** to occur within the study area.
Acronychia littoralis	Scented Acronychia	-	Endangered	-	CMA	Scented Acronychia is found between Fraser Island in Queensland and Port Macquarie on the north coast of NSW within 16 kilometers of the coast. Scented Acronychia grows in littoral rainforest on sand.	This species is considered **unlikely** to occur with the study area.
Aldrovanda vesiculosa	Waterwheel Plant	-	Endangered	-	CMA	Known in NSW only from lagoons in the Moruya area on the south coast, from the Evans Head area on the north coast and from north of Guyra on the New England Tablelands. Found free-floating in near-coastal shallow freshwater lagoons that are rich in organic matter, within 5km of coastline.	This species is considered **unlikely** to occur with the study area.
Allocasuarina defungens	Dwarf Heath Casuarina	-	Endangered	Endangered	CMA; PMST	Dwarf Heath Casuarina is found in NSW from Nabiac to Byron Bay. It grows mainly in tall heath on sand, but can also occur on clay soils and sandstone.	This species is considered **unlikely** to occur with the study area.
Almaleea cambagei	Torrington Pea	-	Endangered	Vulnerable	Atlas; CMA; PMST	Populations occur within Torrington State Conservation Area on the New England Tablelands, with a few populations potentially occurring in the adjacent agricultural lands. It is known from fewer than 15 populations and has a highly restricted distribution with an extent of occurrence of approximately 88 square km. This species grows in wet heath and acid swamp areas and along watercourses on granite, above 900 m altitude.	This species is considered **likely** to occur within the study area.

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Amyema plicatula	Amyema plicatula	-	Endangered	-	CMA	Endemic to New South Wales and is known from only one location. The population occurs within a remnant rainforest fragment on cleared farmland within the Rocky Creek area, north of Lismore in north-east New South Wales.	This species is considered **unlikely** to occur with the study area.
Angiopteris evecta	Giant Fern	-	Endangered	-	CMA	Common in the Queensland wet tropics, rare in southern Queensland and only one plant known in the wild in NSW, in the Burringbar Range near Murwillumbah.	This species is considered **unlikely** to occur with the study area.
Angophora exul	Gibraltar Rock Apple	-	Endangered	-	Atlas; CMA	Gibraltar Rock Apple is a rare species occurring only on open scree on a ridge of acid volcanic outcrops on Gibraltar Rock. The habitat is dry open woodland on the steep south-west slopes and crest of the outcrop, with skeletal to shallow loam soil. The species is restricted to within 10k of Rock of Gibraltar, west of Tenterfield.	This species is considered **likely** to occur within the study area.
Angophora robur	Sandstone Rough-barked Apple	-	Vulnerable	-	CMA	Occurs in a band from around Glenreagh, north-west of Coffs Harbour, to the Coaldale area north-west of Grafton, with an isolated occurrence farther west near Nymboida. within the Northern Rivers CMA there are know occurences within; Clarence Lowlands, Clarence Sandstones and the Dalmorton sub regions. The species occurs in dry open forest in sandy or skeletal soils on sandstone, or occasionally granite, with frequent outcrops of rock.	This species is considered **likely** to occur within the study area.
Archidendron hendersonii	White Laceflower	-	Vulnerable	-	CMA	From north Queensland south to the Richmond River in north-east NSW. It is found on a variety of soils including coastal sands and those derived from basalt and metasediments within riverine and lowland subtropical rainforest and littoral rainforest.	This species is considered **likely** to occur within the study area.
Arthraxon hispidus	Hairy Jointgrass	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Occurs in the northern tablelands and north coast of NSW, but is never common. Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps. The species is prodicted to occur within the Norhtern Rivers CMA subregions: Clarence Lowlands, Clarence Sandstones, Cateract, Richmond-Tweed, Dalmorton	This species is considered **likely** to occur within the study area.

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Arthropteris palisotii	Lesser Creeping Fern	-	Endangered	-	CMA	North-eastern NSW and also in Queensland. This species may be extinct in NSW. Lesser Creeping Fern is known to occur in rainforest, mainly on tree trunks in the Woodenbong sub-region of the Northern Rivers Catchment Management Region.	This species is considered **likely** to occur within the study area.
Astrotricha cordata	Heart-leaved Star Hair	-	Endangered	-	Atlas	This species grows in dry eucalypt forest on exposed rocky summits, cliff edges and rocky slopes. It is restricted to Mt Belmore State Forest and Mount Neville Nature Reserve.	This species is considered **unlikely** to occur with the study area.
Astrotricha roddii	Rod's Star Hair	-	Endangered	Endangered	Atlas; CMA; PMST	Occurs in NSW in the Ashford area north of Inverell, including Kwiambal and Kings Plains National Parks, Severn River Nature Reserve and Severn River State Forest. Rod's Star Hair usually grows in low dry woodland and shrublands on granite and acid volcanic outcrops, often in rock crevices.	This species is considered **likely** to occur within the study area.
Babingtonia granitica	Granite Babingtonia	-	Vulnerable	Vulnerable (currently listed as Kardomia granitica)	CMA ; PMST	The Granite Babingtonia is restricted to three small populations in the tableland granite country around Stanthorpe, Queensland. There are no records of this species from NSW, but it is likely to occur in Bald Rock National Park, within the Stanthorpe Plaueau sub region of the Norther Niver CMA. The Granite Babingtonia grows in shallow peaty soil associated with crevices in extensive granite outcrops.	This species is considered **likely** to occur within the study area.
Babingtonia silvestris	Woodland Babingtonia	-	Endangered	-	Atlas	Scattered localities in north-east NSW and southern Queensland. In NSW the species is restricted to east of Bostobrick in the Chaelundi CMA sub-region and east of Nymboida in the Dalmorton CMA sub-region	This species is considered **unlikely** to occur with the study area.
Baloghia marmorata	Jointed Baloghia	-	Vulnerable	-	CMA	Known within the Lismore district in north-east NSW. In NSW, Jointed Baloghia is found in subtropical rainforest on soils derived from basalt.	This species is considered **unlikely** to occur with the study area.

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Belvisia mucronata	Needle-leaf Fern	-	Endangered	-	CMA	This species is restricted to Queensland and NSW. In NSW, it is known within the Clarence Lowlands of the Northern Rivers CMA. The fern forms small clumps on trees or rocks in dry rainforest or along creeks in moist open forest.	This species is considered **likely** to occur within the study area.
Bertya pinifolia	a shrub	-	-	Vulnerable	PMST	Bertya pinifolia occurs in south-east Queensland where it is restricted to rocky areas in the Boonah district. Bertya pinifolia grows in open montane heath or shrubland communities with stunted eucalypt emergent's on rocky ridges, cliff lines or mountain summits on skeletal soils overlying rhyolite.	This species is considered **unlikely** to occur with the study area.
Boronia boliviensis	Bolivia Hill Boronia	-	Endangered	-	CMA	Bolivia Hill Boronia is known only to occur within Bolivia Hill Nature Reserve and up to 20km beyond the reserve, which is aproximately 30km south of Tenterfield. The species grows in dry sclerophyll forest amongst granite boulders. The species also grows in heathland on shallow soil in the cracks of granite outcrops.	This species is considered **unlikely** to occur with the study area.
Boronia granitica	Granite Boronia	-	Vulnerable	Endangered	Atlas; PMST	Granite Boronia occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland. Grows on granitic soils amongst rock outcrops, often in rock crevices, and in forests and woodlands on granite scree and shallow soils. Important site characteristics include low precipitation and high levels of solar radiation. This semi-arid soil environment will have selected the more xerophytic species from the available regional assemblage of rainforest species.	This species is considered **likely** to occur within the study area.
Boronia repanda	Granite Rose	-	Endangered	-	CMA	This species has been recently re-discovered in NSW from woodland close to the NSW-Queensland border, east of Stanthorpe. Within Queensland, the species is restricted to granite outcrops where it grows in sandy soil within dry sclerophyll forest and heath.	This species is considered **unlikely** to occur with the study area.

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Boronia umbellata	Orara Boronia	-	Vulnerable	-	CMA	Found at only a few locations between Glenreagh and Lower Bucca, north of Coffs Harbour, but it is locally common in the restricted area where it occurs. The Northern Rivers CMA has populations within the Clarance Lowlands and and Claranence Sandstones sub-CMAs however these populations are found below Grafton. This boronia grows as an understorey shrub in and around gullies in wet open forest.	This species is considered **unlikely** to occur with the study area.
Bosistoa selwynii	Heart-leaved Bosistoa	-	-	Vulnerable	PMST	It Is known from Maryborough in Queensland south to the Tweed River district in north-east NSW. Occurs on deep asaltic soils. This species occurs on deep asaltic soils in rainforest up to 300m. In NSW, it prefers alluvial flats, particularly creek banks.	This species is considered **unlikely** to occur with the study area.
Bosistoa transversa	Yellow Satinheart	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	From Maryborough in Queensland south to the Nightcap Range north of Lismore in north-east NSW in lowland subtropical rainforest up to 300 m in altitude. Wet and dry Sclerophyll forest as well.	This species is considered **unlikely** to occur with the study area.
Brachyscome ascendens	Border Ranges Daisy	-	Endangered	-	CMA	Restricted to south-east Queensland and north-east NSW. Currently known from only one location in NSW, on the Tweed Escarpment in the Border Ranges National Park on montane shrubland on clifftops and benches in thin, rocky soils of basaltic origin	This species is considered **unlikely** to occur with the study area.
Bulbophyllum globuliforme	Hoop Pine Orchid	-	Vulnerable	Vulnerable	CMA; PMST	Found almost exclusively in the McPherson Range between NSW and Queensland, at altitudes between 300 and 600 m. It also occurs at Maleny and Noosa in south-east Queensland. This species grows on Hoop Pines (Araucaria cunninghamii) in upland subtropical rainforest. It is usually found on the upper trunk and branches of the Hoop Pines which protrude from the general rainforest canopy.	This species is considered **unlikely** to occur with the study area.

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Cadellia pentastylis	Ooline	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Forms a closed or open canopy mixing with eucalypt and cypress pine species. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth. Populations display a variety of age classes including large mature trees, suckering regrowth and seedlings. The total area occupied by Ooline is only about 1200 hectares, with remaining populations in NSW still threatened to various degrees by clearing for agriculture and grazing pressures. Appears to flower spasmodically, during a general flowering period of October to January.	This species was **recorded** within the study area.
Caesalpinia bonduc	Knicker Nut	-	Endangered	-	CMA	Knicker Nut is found on the north coast of NSW on sandy, coral-derived soil close to the shoreline, in coastal scrub vegetation, in full sun or light shade.	This species is considered **unlikely** to occur with the study area.
Caesia parviflora var. minor	Small Pale Grass-lily	-	Endangered	-	Atlas	There is only one outlying population in NSW in Barcoongere State Forest, between Grafton and Coffs Harbour. This species is found in damp places in open forest on sandstone.	This species is considered **unlikely** to occur with the study area.
Caladenia atroclavia	Black-clubbed Spider-orchid	-	-	Endangered	PMST	Caladenia atroclavia is known from four populations, three in Girraween National Park and one in the Wyberba area of the Darling Downs, south-east Queensland. It grows in shrubby open forests in well-drained grey gravelly loam of granitic origin This species occurs within the Border Rivers Natural Resource Management Region near or within the Girraween National Park, east of Tenterfield.	This species is considered **likely** to occur within the study area.
Callistemon linearifolius	Netted Bottlebrush	-	Vulnerable	-	CMA	The Netted Bottlebrush is known or predicted to occur in the; Clarence Lowlands and Claranece Sandstones sub-regions of the Northern Rivers Catchment Management Region growing in dry sclerophyll forest on the coast and adjacent ranges.	This species is considered **likely** to occur within the study area.

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Callistemon pungens		-	-	Vulnerable	PMST	The species occurs in south-east Queensland and the northern tablelands of northeast NSW. In NSW, it occurs from near Inverell to the eastern escarpment in New England, along rocky watercourses usually with sandy granite (or occasionally basalt) creek beds, and generally among naturalised species, from near Inverell to the eastern escarpment at New England N.P. This species occurs within Border Rivers–Gwydir CMA and Northern Rivers (NSW) CMA Regions.	This species is considered **likely** to occur within the study area.
Callitris baileyi	Bailey's Cypress Pine	-	Endangered	-	CMA	The only recent record in NSW is a small population in Koreelah National Park and adjacent private land on the NSW–Queensland border west of Woodenbong in the NOrthern RIvers CMA. Old records exist for Acacia Creek and Sandilands near Tabulam. The species occurs in rocky, hilly or mountainous areas, usually near creeks, and on shallow and often clay soils. In NSW the population occurs in open grassy eucalypt forest, near a creek.	This species is considered **likely** to occur within the study area.
Callitris oblonga	Pygmy Cypress Pine	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Pygmy Cypress Pine is represented by two subspecies in NSW and one in Tasmania. Subsp. parva occurs in northern NSW on the eastern edge of the New England Tablelands within the Stanthorpe sub region of the NOrthern Rivers CMA. This species grows in sand along watercourses in shrubland and open woodland in granite country; it also occurs in drier sites, including exposed ridges.	This species is considered **likely** to occur within the study area.
Capparis canescens	Wild Orange	-	Endangered	-	CMA	Occurs in eastern Queensland and has recently been confirmed as occurring in north-western NSW. The species was known in NSW from a single population about 20 km NNW of Bonshaw and 50 km north of Ashford, however this population is reported to have recently been cleared by roadworks. Seven plants are said to still survive at the site.	This species is considered **unlikely** to occur with the study area.
Cassia brewsteri var. marksiana	Brush Cassia	-	Endangered	-	CMA	Occurs north from Brunswick Heads, around Murwillumbah, restricted to within 20km of Mt Nullum. The species is found in littoral and riverine rainforest, and in regrowth vegetation on farmland and along roadsides, preferring more fertile soil-types and is often found in low and flat sites.	This species is considered **unlikely** to occur with the study area.

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Centranthera cochinchinensis	Swamp Foxglove	-	Endangered	-	CMA	Predicted to occur in swampy or moist sites within the Northern Rivers CMA in the Clarence Lowlands and Clarence Sandstones sub-CMAs.	This species is considered **likely** to occur within the study area.
Chamaesyce psammogeton	Sand Spurge	-	Endangered	-	CMA	Sand Spurge is found sparsely along the coast from south of Jervis Bay to Queensland (and Lord Howe Island). Grows on fore-dunes and exposed headlands, within 1km of the coast, often with Spinifex (Spinifex sericeus).	This species is considered **unlikely** to occur with the study area.
Choricarpia subargentea	Giant Ironwood	-	Endangered	-	CMA	Known in NSW only from Mount Chincogan near Mullumbimby and one recent record at Jiggi north-west of Lismore, and in Queensland from Boonah to Imbil. At one of the NSW sites, Giant Ironwood is found in dry rainforest regrowth consisting of thickets growing in steeply sloping paddocks on basalt-derived soil.	This species is considered **unlikely** to occur with the study area.
Clematis fawcettii	Northern Clematis	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Found in widely dispersed areas in southern Queensland and in north-east NSW within the Norther Rivers CMA subregions: Clarence Lowlands, Woodenbong, Richmond-Tweed and Cataract. This species occurs in drier rainforest, usually near streams.	This species is considered **likely** to occur within the study area.
Corchorus cunninghamii	Native Jute	-	Endangered	Endangered	CMA; PMST	Occurs from the Richmond River in north-east NSW to the Brisbane River in Queensland. In NSW populations occur at Bungabbee and Toonumbar. This species occurs in ecotones between wet eucalypt forest and dry to dry-subtropical rainforest on sheltered slopes and gullies, and grassy, open forest on exposed slopes and ridges.	This species is considered **likely** to occur within the study area.
Corokia whiteana	Corokia	-	Vulnerable	Vulnerable	CMA	Occurs only in north-east NSW and has a highly restricted distribution. Three distinct populations are known: one in the Nightcap Range, one in the Tweed Valley, and the other close to the coast near Brunswick Heads.	This species is considered **unlikely** to occur with the study area.

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Corynocarpus rupestris subsp. rupestris	Glenugie Karaka	-	Vulnerable	Vulnerable	Atlas; CMA	This species is only known from Glenugie Peak Flora Reserve, south-east of Grafton. It occurs in dry rainforest on steep basalt bolder slopes.	This species is considered **unlikely** to occur with the study area.
Cryptocarya foetida	Stinking Cryptocarya	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Populations have been recorded from coastal south-east Queensland and north-east NSW south to Iluka. This species is found in littoral rainforest, on sandy soils, but mature trees are also found on basalt soils.	This species is considered **unlikely** to occur with the study area.
Cryptostylis hunteriana	Leafless Tongue-orchid	-	Vulnerable	Vulnerable	PMST	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. This species is known to occur in the Clarence Lowlands sub region of the Norther Rivers CMA. This species does not have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland and open areas in the understorey.	This species is considered **likely** to occur within the study area.
Cupaniopsis serrata	Smooth Tuckeroo	-	Endangered	-	CMA	The species occurs in Queensland northern NSW, where it is confined to the Tweed Valley in subtropical and dry rainforest.	This species is considered **unlikely** to occur with the study area.
Cynanchum elegans	White-flowered Wax Plant	-	Endangered	Endangered	Atlas; CMA	This species is restricted in NSW to Brunswick Heads in the north to Gerroa in the South and is found within the Northern Rivers CMA. The species occurs on the edge of dry rainforest vegetation.	This species is considered **likely** to occur within the study area.
Cyperus aquatilis	Water Nutgrass	-	Endangered	-	Atlas; CMA	In NSW this species is only known from a few sites near Grafton. It grows in Ephemerally wet sites, such as roadside ditches and seepage areas from small cliffs in sandstone areas.	This species is considered **unlikely** to occur with the study area.

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Cyperus rupicola	Cliff Sedge	-	Vulnerable	-	CMA	Cliff Sedge is found in southern Queensland and north-eastern NSW. It is known from only two locations in NSW, near Mt Warning and within Nightcap National Park. Cliff Sedge grows amongst rocks on the exposed tops of cliffs and on cliff faces or at the base of cliffs, near forest.	This species is considered **unlikely** to occur with the study area.
Cyperus semifertilis	Missionary Nutgrass	-	Endangered	-	CMA	NSW north coast and south-east Queensland. Currently known from only one site in NSW, in the Mullumbimby area, with an estimated population of about 50 plants. Open forest dominated by White Mahogany (Eucalyptus acmenoides).	This species is considered **unlikely** to occur with the study area.
Daphnandra sp. C Illawarra	Illawarra Socketwood	-	Endangered	-	Atlas	Restricted to the Illawarra region where it has been recorded from the LGAs of Shoalhaven, Kiama, Shellharbour and Wollongong. Occupies the rocky hillsides and gullies of the Illawarra lowlands, occasionally extending onto the upper escarpment slopes. Associated vegetation includes rainforest and moist eucalypt forest. Associated soils are loams and clay loams derived from volcanic and fertile sedimentary rocks. One outlier on the northern edge of Washpool National Park in northern NSW.	This species is considered **unlikely** to occur with the study area.
Davidsonia jerseyana	Davidson's Plum	-	Endangered	-	CMA	Restricted to north-east NSW to as far south as Wardell. Restricted to lowland subtropical rainforest and wet eucalypt forest at low altitudes (below 300m). Many trees are isolated in paddocks and on roadsides in former rainforest habitats. In the Northern Rivers CMA the species is restricted north of Ballina and east of Tyalgum	This species is considered **unlikely** to occur with the study area.
Davidsonia johnsonii	Smooth Davidson's Plum	-	Endangered	Endangered	CMA	Known distribution is restricted to south-east Queensland and north-east NSW south to Tintenbar. This species occurs in lowland subtropical rainforest and wet eucalypt forest at low altitudes (below 300m).	This species is considered **unlikely** to occur with the study area.

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Dendrobium melaleucaphilum	Spider orchid	-	Endangered	-	CMA	Occurs in coastal districts and nearby ranges, extending from Queensland to its southern distributional limit in the lower Blue Mountains. In NSW, it is currently known from seven recent collections. There has been no subsequent confirmation from the locations of three earlier (pre-1922) collections and it is possible that these are now extinct.There are predictions for occurance within the Clarance Lowlands and Clarence Sandstones sub-CMAs. The species grows frequently on Melaleuca styphelioides, less commonly on rainforest trees or on rocks in coastal districts.	This species is considered **likely** to occur within the study area.
Dendrocnide moroides	Gympie Stinger	-	Endangered	-	CMA	From north Queensland, where it is fairly common, south to the Clarence River in north-east NSW. It is very rare in the southern-most part of its range. Occurs in lowland rainforest, especially in gaps or other disturbed sites.	This species is considered **unlikely** to occur with the study area.
Desmodium acanthocladum	Thorny Pea	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	This species is found in the Lismore area, and there are also records from near Grafton, Coraki, Casino and the Mount Warning area and prefers dry rainforest and fringes of riverine subtropical rainforest on basalt-derived soils.	This species is considered **likely** to occur within the study area.
Dichanthium setosum	Bluegrass	-	Vulnerable	Vulnerable	Atlas; CMA	The species occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, within the Northern River as well as Border Rivers/Gwydir CMAs. Bluegrass is associated with heavy basaltic black soils. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	This species was **recorded** within the study area.
Digitaria porrecta	Finger Panic Grass	-	Endangered	Endangered	CMA; PMST	This grass occurs in native grassland, woodlands or open forest with a grassy understorey, on richer soils. Often found along roadsides and travelling stock routes where there is light grazing and occasional fire. In NSW, the most frequently recorded associated tree species are Eucalyptus albens and Acacia pendula. Common associated grasses and forbs in NSW sites include Austrostipa aristiglumis, Enteropogon acicularis, Cyperus bifax, Hibiscus trionum and Neptunia gracilis.Flowering season is summer or late summer from mid-January to late February, with seeds maturing and falling from the plant soon after.	This species is considered **likely** to occur within the study area.

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		FM Act	TSC Act	EPBC Act			
Diospyros mabacea	Red-fruited Ebony	-	Endangered	Endangered	CMA	Occurs only in north-east NSW. It is found in a few stands on the Tweed and Oxley Rivers, upstream from Murwillumbah, on Stotts Island in the lower Tweed River and one other small population west of Mullumbimby on the Brunswick River. Usually grows as an understorey tree in lowland subtropical rainforest, often close to rivers. Soils are generally basalt-derived or alluvial	This species is considered **unlikely** to occur with the study area.
Diploglottis campbellii	Small-leaved Tamarind	-	Endangered	Endangered	CMA	Recorded from the coastal lowlands between Richmond River on the Far North Coast of NSW and Mudgeeraba Creek on the Gold Coast hinterland, Queensland. Confined to the warm subtropical rainforests of the NSW-Queensland border lowlands and adjacent low ranges. Restricted to north of Ballina. The forest types in which the species occurs vary from lowland subtropical rainforest to drier subtropical rainforest	This species is considered **unlikely** to occur with the study area.
Diuris pedunculata	Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid	-	Endangered	Endangered	PMST	Confined to NSW. It was originally found scattered south of Tenterfield to the Hawkesbury River, but is now mainly found on the New England Tablelands. The Small Snake Orchid grows on grassy slopes or flats. Often on peaty soils in moist areas. Also on shale and trap soils, on fine granite, and among boulders.	This species is considered **unlikely** to occur with the study area.
Diuris sp. aff. chrysantha	Byron Bay Diuris	-	Endangered	-	CMA	This orchid is known from a single location only, at Byron Bay in north-east NSW. Only about 20 plants have been recorded.Occurs in low-growing grassy heath on clay soil.	This species is considered **unlikely** to occur with the study area.
Doryanthes palmeri	Giant Spear Lily	-	Vulnerable	-	CMA	Giant Spear Lily occurs in far north-east NSW and south-east Queensland. In NSW, it occurs on the coastal ranges that are part of the Mt Warning Caldera. Its southern distributional limit is Mount Billen. Most populations consist of only a few hundred individuals. Giant Spear Lily occurs on exposed rocky outcrops on infertile soils or on bare rock. It grows in a narrow band of vegetation along the cliff-tops and on steep cliff-faces or rocky ledges in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Drynaria rigidula	Basket Fern	-	Endangered	-	CMA	In NSW it is only found north of the Clarence River, in a few locations at Maclean, Bogangar, Byron Bay, Mullumbimby, in the Tweed Valley and at Woodenbong.	This species is considered **unlikely** to occur with the study area.
Eidothea hardeniana	Nightcap Oak	-	Endangered	Critically Endangered	CMA	Nightcap Oak is restricted to a single population on the southern side of the Nightcap Range, north of Lismore in north-east NSW	This species is considered **unlikely** to occur with the study area.
Elaeocarpus sp. Rocky Creek	Minyon Quandong	-	Endangered	Endangered	CMA	Thought to be extinct until 1992, the species is now known to occur in Whian Whian State Conservation Area and Nightcap National Park north of Lismore, and in Mount Jerusalem National Park west of Mullumbimby. Often associated with warm temperate or subtropical rainforest, and where rainforest and wet eucalypt forest meet.	This species is considered **unlikely** to occur with the study area.
Elaeocarpus williamsianus	Hairy Quandong	-	Endangered	Endangered	CMA	Distribution is restricted to a very few sites between Goonengerry and Burringbar in north-east NSW. Subtropical to warm temperate rainforest, including regrowth areas where it has apparently regrown from root suckers after clearing. Soils are derived from metasediments.	This species is considered **unlikely** to occur with the study area.
Eleocharis tetraquetra	Square-stemmed Spike-rush	-	Endangered	-	CMA	Thought to be extinct in NSW until it was rediscovered in 1997 at Boambee near Coffs Harbour. It has since been found in other north coast localities near Grafton and Murwillumbah.	This species is considered **unlikely** to occur with the study area.
Elyonurus citreus	Lemon-scented Grass	-	Endangered	-	CMA	Lemon-scented Grass occurs north from Grafton in NSW. It is only known from localities south of Casino, north-west of Grafton, near Cudgen Lake on the Tweed coast and in Yuraygir National Park. Lemon-scented Grass grows in sandy soils near rivers or along the coast in wallum areas or sand dunes. At the NSW locations, the species has been found growing in infertile white sands.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status FM Act	TSC Act	Common-wealth Status EPBC Act	Source	Distribution and Habitat Requirements	Suitability Outcome
Endiandra floydii	Crystal Creek Walnut	-	Endangered	-	CMA	This species occurs in warm temperate or subtropical rainforest with Brush Box overstorey, and in regrowth rainforest and Camphor Laurel forest. Confined to the Tweed and Brunswick Valleys and Byron Bay area of north-east NSW, and to one or two locations in south-east Queensland.	This species is considered **unlikely** to occur with the study area.
Endiandra hayesii	Rusty Rose Walnut	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The species has a a restricted distribution from Burleigh Heads in Queensland to the Richmond River in north-east NSW. It is locally abundant in some parts of its range in NSW.This species occurs in sheltered moist gullies in lowland subtropical and warm temperate rainforest on alluvium or basaltic soils.	This species is considered **likely** to occur within the study area.
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	-	Endangered	-	Atlas; CMA	Occurs in Queensland and in north-east NSW south to Maclean. It is sparsely distributed within this range. Occurs within subtropical rainforest or wet eucalypt forest, chiefly at lower altitudes.	This species is considered **unlikely** to occur with the study area.
Eucalyptus boliviana	Bolivia Stringybark	-	Vulnerable	-	CMA	Eucalyptus boliviana is very rare, restricted to Bolivia Hill near Deepwater (between Glen Innes and Tenterfield) on the New England Tablelands. The species is known only from a small stand near the crest of Bolivia Hill and is restricted to low dry sclerophyll woodland habitat, on granite outcrops and acid volcanics at 1200 m altitude. Soils are gritty and sandy.	This species is considered **unlikely** to occur with the study area.
Eucalyptus caleyi subsp. ovendenii	Ovenden's Ironbark	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Eucalyptus caleyi subsp. ovendenii occurs from west of Guyra to west of Tenterfield on the New England Tablelands of NSW. Localities include 'Moorabinda' station. The taxon is said to be common in the western half of Torrington State Conservation Area, occasionally dominating woodland communities. Preferred altitudes are 610 to 820 m, on granitic substrates. Ovenden's Ironbark occupies a higher geographical range than that of subspecies caleyi, occurring on the crests of broad high ridges and replacing subspecies caleyi inhabiting the lower slopes in the same general area.	This species was **recorded** within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Eucalyptus glaucina	Slaty Red Gum	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. The species grows in grassy woodland and dry eucalypt forest and deep, moderately fertile and well-watered soils.	This species is considered **likely** to occur within the study area.
Eucalyptus magnificata	Northern Blue Box	-	Endangered	-	Atlas; CMA	Known in NSW from two separate locations on the New England Tablelands, around Hillgrove east of Armidale and in the Glen Innes area. Only a single population occurs in a conservation reserve, in Oxley Wild Rivers National Park. Grassy open forest or woodland on shallow, sandy or loamy soils. Occurs on moderately hilly sites and at the edge of gorges, usually at altitudes from 900 - 1050 m.	This species is considered **unlikely** to occur with the study area.
Eucalyptus mckieana	McKie's Stringybark	-	Vulnerable	Vulnerable	PMST	Confined to the drier western side of the New England Tablelands of NSW, from Torrington to Bendemeer. Most populations occur on private property, but it does occur in Kings Plain National Park, Torrington State Conservation Area and Severn River Nature Reserve. Eucalyptus mckieana is found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites.	This species is considered **unlikely** to occur with the study area.
Eucalyptus microcodon	Border Mallee	-	Endangered	-	Atlas; CMA	Four populations are distributed along the NSW–Queensland border. Found within the Northern Rivers CMA, potenitally in the sub regions: Woodenbong (restricted to 10km of QLD border), Washpool and Richmond-Tweed on shallow infertile soils on mountain tops.	This species is considered **unlikely** to occur with the study area.
Eucalyptus nicholii	Narrow-leaved Black Peppermint	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, within the Tenterfield and Binghi Plateau sub regions of the Northern Rivers CMA largely on private property. The Eucalyptus grows in dry grassy woodland, on shallow and infertile soils, mainly on granite.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Eucalyptus rubida subsp. barbigerorum	Blackbutt Candlebark	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Known from scattered populations on the New England Tablelands from Guyra to the Tenterfield area, within the Northern Rivers and Border RIvers/Gwydir CMAs. Most populations occur on private property. Occurs on woodland on medium or high fertility soils, often on cold flats.	This species is considered **likely** to occur within the study area.
Eucalyptus scoparia	Wallangarra White Gum	-	Endangered	Vulnerable	Atlas; CMA; PMST	Occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. Occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park.	This species is considered **likely** to occur within the study area.
Eucalyptus tetrapleura	Square-fruited Ironbark	-	Vulnerable	Vulnerable	Atlas; CMA	Restricted to the coastal lowlands and foothills of northern NSW around Casino and Grafton. The species is found within the Clarence Sandstones and Clarence Lowlands sub regions of the Norther Rivers CMA within Dry or moist eucalypt forest on moderately fertile soil, often in low areas with poor drainage.	This species is considered **likely** to occur within the study area.
Euphrasia bella	Pretty Eyebright	-	Vulnerable	Vulnerable	CMA	It occurs only on the McPherson Range, on Mount Merino in Limpinwood Nature Reserve. It occirs on the edge of cliffs near cool temperate rainforest.	This species is considered **unlikely** to occur with the study area.
Euphrasia orthocheila subsp. peraspera	Tenterfield Eyebright	-	Endangered	-	Atlas; CMA	Probably extinct throughout much of its former range, this subspecies has been recorded from Dorrigo to Tenterfield and west to Torrington, although most records are very old. Currently only known from two swamps in the Tenterfield area. Recorded from 'moist open situations' such as swamps.	This species is considered **likely** to occur within the study area.
Floydia praealta	Ball Nut	-	Vulnerable	Vulnerable	Atlas; CMA	Small scattered populations distributed from Gympie in Queensland to the Clarence River in north-east NSW in riverine and subtropical rainforest, usually on soils derived from basalt.	This species is considered **unlikely** to occur with the study area.
Fontainea australis	Southern Fontainea	-	Vulnerable	Vulnerable	CMA	Restricted to the Tweed Valley and a few locations in the upper reaches of the Richmond Valley. Restricted to the Tweed Valley and a few locations in the upper reaches of the Richmond Valley, within 45km of the coast.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Fontainea oraria	Coastal Fontainea	-	Critically Endangered	Endangered	CMA	Coastal Fontainea is extremely rare, restricted to a small number of trees at Lennox Head in north-east NSW. Coastal Fontainea occurs in remnant regrowth littoral rainforest on highly fertile red-brown krasnozem soils derived from the basalt.	This species is considered **unlikely** to occur with the study area.
Gaultheria viridicarpa subsp. merinoensis	Mt Merino Waxberry	-	Vulnerable	-	CMA	Restricted to Mount Merino in Limpinwood Nature Reserve on the NSW-Qld border. Grows in crevices and cliff faces in high altitude woodland.	This species is considered **unlikely** to occur with the study area.
Geijera paniculata	Axe-Breaker	-	Endangered	-	Atlas; CMA	Moderately common in restricted habitat in Queensland between the Brisbane River and the central Queensland coast, but very rare in north-east NSW, where it is known from the Tweed, Lismore and Wardell areas. Axebreaker is found in dry subtropical rainforest and vine scrub, often along rivers.	This species is considered **likely** to occur within the study area.
Geodorum densiflorum	Pink Nodding Orchid	-	Endangered	-	Atlas; CMA	There are thought to be less than 20 populations of Pink Nodding Orchid in NSW, all north of Bundjalung National Park, and including Tweed Shire. The species also occurs in Queensland. Dry eucalypt forest and coastal swamp forest at lower altitudes, often on sand.	This species is considered **likely** to occur within the study area.
Goodenia macbarronii	Narrow Goodenia	-	-	Vulnerable	CMA	Widely distributed throughout the tablelands, western slopes and western plains. Recorded in the Torrington district, amongst others. Grows in ephemerally damp or wet sites and is often common at sites after good winter-rainfall periods. It favours moist, shaded, sandy sites, soils with impeded drainage, damp muddy areas of winter inundation, spring-fed paddocks and open areas where water is more available.	This species is considered **likely** to occur within the study area.
Gossia fragrantissima	Sweet Myrtle	-	Endangered	Endangered	Atlas; CMA; PMST	Occurs in south-east Queensland and in north-east NSW south to the Richmond River. Mostly found on basalt-derived soils.Grows in dry subtropical and riverine rainforest.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Grammitis stenophylla	Narrow-leaf Finger Fern	-	Endangered	-	Atlas; CMA	Occurs in eastern Queensland and eastern NSW. In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabrai. Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	This species is considered **likely** to occur within the study area.
Grevillea banyabba	Banyabba Grevillea	-	Vulnerable	Vulnerable	CMA	Restricted to the Fortis Creek–Coaldale area between Grafton and Whiporie. Most plants are in one population in the Banyabba Nature Reserve. Shrubby open eucalypt forest growing on low ridges and slopes with poor sandy soil. Often growing in association with Bastard White Mahogany *Eucalyptus psammitica* , Sandstone Rough-barked Apple *Angophora robur* and Pink Bloodwood *Corymbia intermedia* .	This species is considered **unlikely** to occur with the study area.
Grevillea beadleana	Beadle's Grevillea	-	Endangered	Endangered	Atlas; CMA; PMST	Known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Shannon Creek south-west of Grafton. Historical records suggest it was also once found near Walcha. Open eucalypt forest with a shrubby understorey. It is usually found on steep granite slopes at high altitudes, although the population at Shannon Creek is at a lower elevation on sandstone.	This species is considered **likely** to occur within the study area.
Grevillea masonii	Mason's Grevillea	-	Endangered	Endangered	Atlas; CMA	Occurs in only a few locations between Grafton and Casino in north-eastern NSW. Occurs on gravely loam soils and in sand in open eucalypt woodland.	This species is considered **unlikely** to occur with the study area.
Grevillea mollis	Soft Grevillea	-	Endangered	Endangered	Atlas	Known only from Gibraltar Range National Park and Nymboida National Park. Ridges, slopes and creekflats in tall eucalypt forest at altitudes between 150 m and 900 m. Typical overstorey species include New England Blackbutt *Eucalyptus campanulata* , Thick-leaved Mahogany *Eucalyptus carnea* and Tindale's Stringybark *Eucalyptus tindaliae* .	This species is considered **unlikely** to occur with the study area.
Grevillea quadricauda	Four-tailed Grevillea	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	In NSW it is found to the north-west of Whiporie in Mount Belmore State Forest and Mount Neville Nature Reserve, and at Tucabia east of Grafton. It also occurs near Toowoomba in south-east Queensland. Grows in gravely loam, in the understorey of dry eucalypt forest, usually along or near creeks.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Haloragis exalata subsp. velutina		-	Vulnerable	Vulnerable	PMST	This subspecies of Tall Sea-berry occurs on the north coast of NSW and southeastern Queensland. It is plentiful in inaccessible areas of the upper Macleay River. Grows in damp places near watercourses. This subspecies also occurs in woodland on the steep rocky slopes of gorges.	This species is considered **unlikely** to occur with the study area.
Hibbertia hexandra	Tree Guinea Flower	-	Endangered	-	CMA	The main occurrence of Guinea Flower Tree is in the coastal ranges of the Mount Warning area of north-east NSW including Mt Warning and Nightcap national parks. However, there is an important separate occurrence in the Wauchope–Kendall area, which may be a new species. Tree Guinea Flower typically grows in heath, open forest or rainforest.	This species is considered **unlikely** to occur with the study area.
Hibbertia marginata	Bordered Guinea Flower	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The species is found in grassy or shrubby dry open eucalypt forest at low altitudes on sandstone. Occurs only in north-east NSW, where it is restricted to the southern Richmond Range between Casino and Grafton.	This species is considered **likely** to occur within the study area.
Hicksbeachia pinnatifolia	Red Boppel Nut	-	Vulnerable	Vulnerable	CMA; PMST	Coastal areas of north-east NSW from the Nambucca Valley north to south-east Queensland. Subtropical rainforest, moist eucalypt forest and Brush Box forest.	This species is considered **unlikely** to occur with the study area.
Homopholis belsonii	Belson's Panic	-	-	Vulnerable	PMST	North from the Warialda district and into Queensland. Grows in dry woodland (eg. Belah) on poor soils. Habitat and ecology appear to be poorly known.	This species is considered **unlikely** to occur with the study area.
Homoranthus binghiensis	Binghi Homoranthus	-	Endangered	-	Atlas	Restricted to the Torrington area south-west of Tenterfield. Associated with isolated granitic outcrops in the far north-eastern tablelands region of NSW. It grows within sandy soil pockets in open and exposed situations on and around the margins of the outcrops. The species appears to prefer heath and shrubland patches in shallow soils at altitudes of 700 to 950 m. Associated species include *Eucalyptus prava, Eucalyptus dealbata* and *Callitris endlicheri* in the overstorey.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Homoranthus croftianus	Bolivia Homoranthus	-	Endangered	-	CMA	Restricted to Bolivia Hill, north of Deepwater on the New England Tablelands of NSW. Associated with isolated granitic outcrops at about 1000 m altitude, growing within crevices of bare rocky slopes and in shallow acidic soil. Associated species include *Callitris endlicheri* , *Eucalyptus prava* , *E. dealbata* , *Leucopogon neoanglicus* , *Micromyrtus sessilis, Kunzea bracteolata, Boronia anethifolia, Leptospermum novae-angliae, Acacia viscidula, Acacia pycnostachya* and *Cryptandra lanosiflora* . Geographic range appears to be only a few kilometres in radius and the population is probably less than 500 individual plants .	This species is considered **unlikely** to occur with the study area.
Homoranthus lunatus	Crescent-leaved Homoranthus	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Occurs near Tenterfield and Torrington on the New England Tablelands of NSW, including Bald Rock and Boonoo Boonoo National Parks near Tenterfield. Crescent-leaved Homoranthus grows in heath, shrub and woodland communities in sandy soils on granite outcrops and slopes. Associated species include *Callitris* woodland with *Micrantheum, Banksia* and *Isopogon* species. A disjunct population of *Homoranthus lunatus* recorded from heath on a granite outcrop, was found associated with *Leptospermum novae-angliae* , *Leucopogon neo-anglicus* , *Leucopogon biflorus, Prostanthera staurophylla, Brachyloma saxicola* and *Olax stricta* .	This species is considered **likely** to occur within the study area.
Homoranthus montanus		-	-	Vulnerable	PMST	Described from the vicinity of Ballandean in the Stanthorpe district of southern Queensland and occurs in two areas separated by 20 km. Occurs in Sundown National Park. Other recorded locations include a number of properties on Stalling Lane and Fletcher Road, Ballandean and Jibbinbar Mountain, where it occurs on both freehold land and in Sundown National Park. Known to grow in shallow, well drained soil in crevices on rock pavements on north-east and easterly slopes of granite hillsides at an altitude of 750–850 m above sea level. It grows in open forest dominated by *Eucalyptus andrewsii* to woodland and heathland dominated by *Callitris endlicheri, E. prava, E. dealbata* and *E. caleyi* subsp. *caleyi.*	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Indigofera baileyi	Bailey's Indigo	-	Endangered	-	CMA	Bailey's Indigo occurs in Queensland and reaches its southern limit in NSW. It is restricted to the far north-east corner of the State, north of Wylie Creek. It is known from only four locations across a limited area. Open woodlands on granite or basalt soils.	This species is considered **unlikely** to occur with the study area.
Isoglossa eranthemoides	Isoglossa	-	Endangered	Endangered	CMA	A very restricted distribution in north-east NSW from the Tweed to the Lismore area, with a single uncertain historical report from south-east Queensland. Understorey of lowland subtropical rainforest, in moist situations on floodplains and slopes. Underlying soils are derived from basalt, metasediments or gabbro.	This species is considered **unlikely** to occur with the study area.
Lepiderema pulchella	Fine-leaved Tuckeroo	-	Vulnerable	-	CMA	Found on the NSW north coast north of Brunswick Heads, and in Queensland. Most records in NSW are from the Tweed Valley, and the majority of known populations are on private land. Occurs in lowland subtropical rainforest in NSW. Found on infertile metasediments and on fertile basalts in the Tweed Valley.	This species is considered **unlikely** to occur with the study area.
Lepidium peregrinum	Wandering Pepper Cress	-	Endangered	Endangered	Atlas; CMA; PMST	Thought to be extinct until recently rediscovered in NSW and Queensland. Targeted searches conducted in 2001 confirmed the species occurs in scattered refugia in north-eastern NSW (near Tenterfield) and south-eastern Queensland. A large population of Wandering Pepper Cress occurs in an open riparian forest on the banks of the Tenterfield creek at Clifton. Sandy alluvium is the main soil type at the site. Associated species at the Clifton site are dominated by *Eucalyptus camaldulensis* and *Casuarina cunninghamiana*, with a variably dense shrubby understorey. Was most abundant in the tussock grassland fringe of the riparian open forest, comprising *Poa* species, *Lomandra longifolia* and *Paspalum dilatatum*.	This species is considered **likely** to occur within the study area.
Leucopogon confertus	Torrington Beard-heath	-	Endangered	Endangered	PMST	Known only from an early record near Torrington on the New England Tablelands. Torrington Beard-heath possibly occurs in open forest and woodland on rocky granite areas.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Lindernia alsinoides	Noah's False Chickweed	-	Endangered	-	Atlas; CMA	North from Buladelah. Currently known from Shannon Creek (near Grafton). Pre-1925 records from Buladelah and Coopernook. Grows in swampy sites in sclerophyll forest and coastal heath. At Shannon Creek, occurs in damp paperbark swamp with *Melaleuca alternifolia* and *Melaleuca quinquinervia*.	This species is considered **unlikely** to occur with the study area.
Lindsaea brachypoda	Short-footed Screw Fern	-	Endangered	-	CMA	In NSW it is mainly found in a few locations north from Minyon Falls in Nightcap National Park. Records exist for Tumbulgum, Mullumbimby and Mooball. It also occurs in the Northern Territory and eastern Queensland. Very moist habitats in subtropical or warm-temperate rainforest or palm forest.	This species is considered **unlikely** to occur with the study area.
Lindsaea incisa	Slender Screw Fern	-	Endangered	-	Atlas; CMA	In NSW it is known only from a few locations between Woombah and just south of Coffs Harbour. Also occurs in north and south-east Queensland. Dry eucalypt forest on sandstone and moist shrubby eucalypt forest on metasediments. It is usually found in waterlogged or poorly drained sites along creeks, where ferns, sedges and shrubs grow thickly.	This species is considered **likely** to occur within the study area.
Macadamia tetraphylla	Rough-shelled Bush Nut	-	Vulnerable	Vulnerable	CMA	Confined chiefly to the Richmond and Tweed Rivers in north-east NSW, extending just across the border into Queensland. Found in subtropical rainforest, usually near the coast.	This species is considered **likely** to occur within the study area.
Macrozamia occidua		-	-	Vulnerable	PMST	Occurs in open forests, on skeletal sandy soils derived from acid volcanic mudstones and greywacke between the altitudes of 800–1000 m. Occur as widely spaced scattered individuals in three locations within Sundown National Park, south-west of Stanthorpe. At one site, the species grows on coarse sandy soil derived from granite in woodland dominated by *Eucalyptus caleyi* subsp. *caleyi, E. acmenoides* and *Allocasuarina inophloia*. The species occurs within the Border Rivers Maranoa–Balonne (Queensland) Natural Resource Management region.	This species is considered **unlikely** to occur with the study area.
Marsdenia longiloba	Slender Marsdenia	-	Endangered	Vulnerable	Atlas; CMA; PMST	Scattered sites on the north coast of NSW north from Barrington Tops. Also occurs in south-east Queensland. Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Maundia triglochinoides		-	Vulnerable	-	Atlas; CMA	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Grows in swamps, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Flowering occurs during warmer months. Associated with wetland species e.g. *Triglochin procerum* .	This species is considered **unlikely** to occur with the study area.
Melaleuca irbyana	Weeping Paperbark	-	Endangered	-	Atlas; CMA	Found in only a few places in north-east NSW, including near Coraki, Casino and Coutts Crossing south of Grafton. Also occurs in near Ipswich south-east Queensland. Open eucalypt forest in poorly drained, usually clay, soils.	This species is considered **likely** to occur within the study area.
Melichrus hirsutus	Hairy Melichrus	-	Endangered	Endangered	CMA	Restricted to a few locations near Grafton in north-east NSW. Dry eucalypt forest with a shrubby understorey on sandy infertile soils with rock outcrops.	This species is considered **unlikely** to occur with the study area.
Melichrus sp. Gibberagee	Narrow-leaf Melichrus	-	Endangered	Endangered	Atlas; CMA	Restricted to north-east NSW. Known only from a single population in Gibberagee State Forest and adjacent private property, about 40 km south of Casino. Low-altitude dry eucalypt forest on gentle slopes.	This species is considered **unlikely** to occur with the study area.
Melicope vitiflora	Melicope vitiflora	-	Endangered	-	CMA	Coast Euodia occurs in Queensland and reaches its southern limit in NSW, where it is largely restricted to coastal areas around Brunswick Heads and Ocean Shores, Broken Head, also in the Tweed Valley and the Nightcap Range. In NSW, it is known from a small number of locations. It is reserved in Broken Head Nature Reserve, Brunswick Heads Nature Reserve and Whian Whian State Conservation Area. Coast Euodia grows in subtropical and littoral rainforest.	This species is considered **unlikely** to occur with the study area.
Mitrasacme pygmaea	Pygmy Bishop's Hat	-	Endangered	-	CMA	In NSW, M. pygmaea is known only from Mt Warning National Park. Grows amongst rock outcrops in open habitats.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Monotaxis macrophylla	Large-leafed Monotaxis	-	Endangered	-	CMA	Large-leaf Monotaxis is recorded from several highly disjunct populations in NSW: eastern edge of Deua NP (west of Moruya), Bemboka portion of South East Forests National Park, Cobar area (Hermitage Plains), the Tenterfield area, and Woodenbong (near the Queensland border). It is also in Queensland. In the northern NSW sites, Monotaxis macrophylla was locally abundant on outcrops especially where burnt. Grows on rocky ridges and hillsides. There is a great diversity in the associated vegetation within NSW (less though in Queensland), encompassing coastal heath, arid shrubland, forests and montane heath from almost sea level to 1300 m altitude.	This species is considered **unlikely** to occur with the study area.
Muehlenbeckia costata	Scrambling Lignum	-	Vulnerable	-	Atlas; CMA	Scattered distribution from Queensland to the Blue Mountains in NSW. Records on the New England Tablelands and North West Slopes include Bald Rock north of Tenterfield, Warra and Butterleaf National Parks near Glen Innes and Mt Kaputar. Grows in coarse sandy soils and peat in heath, mallee and open eucalypt woodland on granite or acid volcanic outcrops at higher altitudes.	This species is considered **likely** to occur within the study area.
Muellerina myrtifolia	Myrtle-leaf Mistletoe	-	Endangered	-	CMA	This mistletoe is rare in south-east Queensland, and in NSW is known only from Wilson Peak Flora Reserve on the NSW–Queensland border north-west of Woodenbong. Dry rainforest on fertile soils, sometimes at high altitude, where it grows on species of rainforest shrubs and vines.	This species is considered **unlikely** to occur with the study area.
Myrsine richmondensis	Ripple-leaf Muttonwood	-	Endangered	Endangered	Atlas; CMA	Known only from a few populations at Coraki, Boatharbour near Lismore, and the Cherry Tree area west of Casino. Subtropical and dry rainforest and swamp forest on creek flats and slopes on basalt derived soil.	This species is considered **likely** to occur within the study area.
Nereia lophocladia	Marine Brown Alga	Critically Endangered	-	-	DII	Has only been found in two places on the coast of Australia; Port Phillip Heads in Victoria and the northern and southern sides of Muttonbird Island at Coffs Harbour in northern New South Wales. The population at Coffs Harbour, discovered in 1980 is the only known population of the marine alga. Nereria lophocladia is found on rocks at the sand/rock interface on the seabed in about 5-7m depth of water.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Niemeyera chartacea	Niemeyera chartacea	-	Endangered	-	CMA	The species occurs in Queensland and reaches its southern limit at the Brunswick River in north-eastern NSW, where it is known from only one site at Brunswick Heads.This population comprises only a few individuals. Littoral and subtropical rainforest on coastal sands or soils derived from metasediments. Subtropical rainforest.	This species is considered **unlikely** to occur with the study area.
Niemeyera whitei	Rusty Plum	-	Vulnerable	-	CMA	Rusty Plum occurs in the coast and adjacent ranges of northern NSW from the Macleay River into southern Queensland. Its distributional stronghold is on the mid north coast around Coffs Harbour. Rainforest and the adjacent understorey of moist eucalypt forest.	This species is considered **likely** to occur within the study area.
Oberonia complanata	Yellow-flowered King of the Fairies	-	Endangered	-	CMA	Within NSW, there are several historical collections (all pre 1917) of this species from Byron Bay and Lismore, and a collection from Coffs Harbour from 1961. More recent observations of this species have been made from Lismore and Wollumbin. This species grows on trees and rocks in littoral rainforest, subtropical rainforest, dry rainforest, wet or dry eucalypt forests, dunes (including stabilised sands), stream-side areas, swampy forests and mangroves.	This species is considered **unlikely** to occur with the study area.
Oberonia titania	Red-flowered King of the Fairies	-	Vulnerable	-	CMA	Red-flowered King of the Fairies occurs on the NSW north coast north from Kendall, and also in in Queensland and Norfolk Island. It is known from 10 locations in NSW, two of which occur within Dorrigo National Park and Washpool National Park. Red-flowered King of the Fairies occurs in littoral and subtropical rainforest and paperbark swamps, but it can also occur in eucalypt-forested gorges and in mangroves.	This species is considered **unlikely** to occur with the study area.
Ochrosia moorei	Southern Ochrosia	-	Endangered	Endangered	Atlas; CMA; PMST	Southern Ochrosia is found in north-east NSW north from the Richmond River, and in south-east Queensland. It is very sparsely distributed within this range. Southern Ochrosia is found in riverine and lowland subtropical rainforest.	This species is considered **unlikely** to occur with the study area.
Oldenlandia galioides	Sweet False Galium	-	Endangered	-	Atlas; CMA	In north-east NSW, known from Whiporie State Forest south of Casino and one location in the Tweed district. Also occurs on the north-west plains of NSW and in Queensland, Northern Territory and Western Australia. Margins of seasonally inundated wetlands in paperbark swamps and Forest Red Gum *Eucalyptus tereticornis* woodlands.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Owenia cepiodora	Onion Cedar	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	North from the Richmond River in north-east NSW extending just across the border into Queensland. Grows in subtropical and dry rainforest on or near soils derived from basalt.	This species is considered **likely** to occur within the study area.
Parsonsia dorrigoensis	Milky Silkpod	-	Vulnerable	Endangered	CMA	Milky Silkpod is found only within NSW, with scattered populations in the north coast region between Kendall and Woolgoolga. Found in subtropical and warm-temperature rainforest, on rainforest margins, and in moist eucalypt forest up to 800 m, on brown clay soils.	This species is considered **unlikely** to occur with the study area.
Peristeranthus hillii	Brown Fairy-chain Orchid	-	Vulnerable	-	CMA	Found in north-eastern NSW, north from Port Macquarie, extending to north-eastern Queensland as far as the Bloomfield River. Restricted to coastal and near-coastal environments, particularly Littoral Rainforest and the threatened ecological community Lowland Rainforest on Floodplain.	This species is considered **unlikely** to occur with the study area.
Persicaria elatior	Tall Knotweed	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Has been recorded in south-eastern NSW (Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	This species is considered **likely** to occur within the study area.
Phaius australis	Southern Swamp Orchid	-	Endangered	Endangered	CMA	Occurs in Queensland and north-east NSW as far south as Coffs Harbour. Historically, it extended farther south, to Port Macquarie. Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	This species is considered **unlikely** to occur with the study area.
Phaius tancarvilleae	Lady Tankerville's Swamp Orchid	-	Endangered	Endangered	CMA	Widespread, though seriously depleted, through Asia, New Guinea and Queensland and at least formerly, in north-east NSW. It may be extinct in north-east NSW. This orchid is found in swampy grassland or swampy forest, including rainforest, eucalypt and paperbark forest.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Phebalium glandulosum subsp. eglandulosum	Rusty Desert Phebalium	-	Endangered	Vulnerable	Atlas; CMA	Found in the Torrington district and in Severn River Nature Reserve north-west of Glen Innes, on the New England Tablelands. Also occurs in Queensland. Restricted to granite outcrop country on the New England Tablelands. Favours exposed and heathy granite areas with cracks and depressions of skeletal sandy soil located amongst the boulders. Sites tend to be relatively open, with the shrubs forming a spreading habit over the bare rocks. Associated species at sites include *Acacia fimbriata, Acacia latisepala, Leptospermum polygalifolium, Kunzea obovata, Brachyloma daphnoides, Calytrix tetragona, Micromyrtus ciliatus, Micromyrtus sessilis, Prostanthera staurophylla* and *Prostanthera teretifolia* .	This species is considered **likely** to occur within the study area.
Phebalium whitei		-	-	Vulnerable	PMST	Confined to the Darling Downs Pastoral District, Qld, from Lyra to Girraween National Park in the Stanthorpe district. Two small populations exist in Girraween National Park. It has been recorded from south-east Qld, border Mountains (eg Wyberba; Lyra, Stanthorpe district, Wallangarra border mountains), Bald Rock Creek and Girraween National Park near Wallangarra, Qld. This species occurs in wet areas (e.g. in cracks in flat expanses of granite rocks and along creek banks) and in open heathland with shallow soils of granite origin.	This species is considered **likely** to occur within the study area.
Phyllanthus microcladus	Brush Sauropus	-	Endangered	-	Atlas; CMA	In NSW confined to a few locations in the Tweed, Brunswick, Richmond and Wilson River Valleys with an outlying population near Grafton. Also occurs in south-east Queensland. Usually found on banks of creeks and rivers, in streamside rainforest.	This species is considered **likely** to occur within the study area.
Pimelea venosa	Bolivia Hill Pimelea	-	Endangered	Endangered	Atlas; CMA; PMST	This Pimelea is known only from the Bolivia Hill area south of Tenterfield. Surveys at known sites and potential habitat conducted in 1999 found no plants. No new records of the species have been reported during the past decade. Has been recorded on deep granite soils or black sandy soils between granite boulders in open woodland. Associated vegetation is dominated by *Eucalyptus* species, with an open understorey of *Xanthorrhoea* and *Solanum* species.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Plectranthus alloplectus	Narrow-leaved Plectranthus	-	Endangered	-	CMA	In north-east NSW it is known from one location near Woodenbong. Also occurs on Mount Barney and Mount Greville in south-east Queensland. Grows on rock pavements and small cliffs, with associated shrubby heath species.	This species is considered **unlikely** to occur with the study area.
Plectranthus nitidus	Nightcap Plectranthus	-	Endangered	Endangered	Atlas; CMA; PMST	Occurs within both NSW and Queensland. Previously known only from Nightcap National Park near Terania Creek in northern NSW. However, the species has now been collected from the Nullum and Richmond Range State Forests. Grows on rocky cliff-faces and boulders, in the shelter and shade provided by the adjacent rainforest. Co-occurs with Plectranthus graveolens and Crofton Weed.	This species is considered **likely** to occur within the study area.
Polygala linariifolia	Native Milkwort	-	Endangered	-	Atlas; CMA	North from Copeton Dam and the Warialda area to southern Queensland; also found on the NSW north coast near Casino and Kyogle, and there is an isolated population in far western NSW near Weebah Gate, west of Hungerford. Sandy soils in dry eucalypt forest and woodland with a sparse understorey. The species has been recorded from the Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of *Eucalyptus caleyi, Eucalyptus dealbata* and *Callitris,* and in yellow podsolic soil on granite in layered open forest. Associated species include *Eucalyptus trachyphloia, Eucalyptus sphaerocarpa, Angophora floribunda, Angophora leiocarpa, Tristania suaveolens, Allocasuarina torulosa* and *Wahlenbergia* species in the understorey.	This species is considered **likely** to occur within the study area.
Pomaderris notata	McPherson Range Pomaderris	-	Vulnerable	-	Atlas; CMA	Occurs mainly in Queensland. In NSW it is known from five sites in the McPherson and Tweed Range areas, including Mount Warning National Park, Mebbin National Park and Limpinwood Nature Reserve. Known from rocky basalt ranges in montane heaths and scrubs or in scrubby rainforest.	This species is considered **likely** to occur within the study area.

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		FM Act	TSC Act	EPBC Act			
Pomaderris queenslandica	Scant Pomaderris	-	Endangered	-	CMA	Widely scattered but not common in north-east NSW and in Queensland. It is only known from a few locations on the New England Tablelands and North West Slopes, including near Torrington and Coolatai, and also from several locations on the NSW north coast. Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	This species is considered **unlikely** to occur with the study area.
Prostanthera cryptandroides subsp. Cryptandroides	Wollemi Mint-bush	-	Vulnerable	Vulnerable	CMA	Occurs in restricted areas but over a fairly broad range from the Lithgow and Sandy Hollow Districts into the Border Rivers/Gwydir Catchment and up into Queensland. At Glen Davis, occurs in open forest dominated by *Eucalyptus fibrosa* . Other eucalypt species may be present as sub-dominants. In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities. Associated communities include: Narrabeen Rocky Heath, Narrabeen Acacia Woodland, Narrabeen Exposed Woodland; Open Heath of *Calytrix tetragona* , *Leptospermum parviflorum, Isopogon dawsonii* ; and Open Scrubland of *Eucalyptus dwyeri, Baeckea densifolia, Dillwynia floribunda, Aotus ericoides* and *Hemigenia cunefolia* . One historical record (1904) from north of Tenterfield (NSW NPWS Atlas).	This species is considered **unlikely** to occur with the study area.
Prostanthera palustris	Swamp Mint-bush	-	Vulnerable	Vulnerable	Atlas; CMA	Only known from the Jerusalem Creek area in the north of Bundjalung National Park, near Evans Head. Grows in poorly drained sandy soils, subject to extended waterlogging, in wet shrubland to heathland. One separate record exists near Upper Mongogarie south of Hogarth Range Nature Reserve.	This species is considered **unlikely** to occur with the study area.
Prostanthera spinosa	Spiny Mint-bush	-	Vulnerable	-	CMA	Occurs in NSW, Victoria and South Australia. In NSW it is located within a small area to the north of Grafton in the NSW North Coast bioregion. The NSW occurrence of P. spinosa is very restricted and disjunct, separated by more than 1000 km from other occurrences in Victoria and South Australia, and may represent a distinct taxon. There are five populations of Prostanthera spinosa known from confirmed records, and possibly several other small populations from anecdotal sightings in Banyabba Nature Reserve. The confirmed records include locations within Fortis Creek National Park and Banyabba Nature Reserve. All known populations are within a linear range of 16-20 km. It grows in skeletal sandy soils of rocky areas.	This species is considered **unlikely** to occur with the study area.

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		FM Act	TSC Act	EPBC Act			
Prostanthera staurophylla sensu stricto	Torrington Mint-bush	-	Endangered	Vulnerable	Atlas; CMA; PMST	Currently known from a single granite outcrop in the Tenterfield area of the New England Tablelands. Within its only current known population, the species occurs in shallow skeletal soil in rock crevices. The site is an exposed granite outcrop near the mountain summit, with skeletal gritty loam soil. *Kunzea parvifolia* is dominant around the outcrop, with *Prostanthera staurophylla* and *Leptospermum variabile* scattered amongst the *Kunzea.*	This species is considered **likely** to occur within the study area.
Pseudanthus ovalifolius	Oval-leafed Pseudanthus	-	Endangered	-	CMA	Recorded in the Torrington area on the New England Tablelands and in Ben Boyd National Park. In the south the species is found in near coastal dry sclerophyll forest growing in sandy soil. Flowering occurs in September and October. In the north, Pseudanthus ovalifolius grows in rocky outcrop areas on granite and flowers during summer.	This species is considered **unlikely** to occur with the study area.
Psilotum complanatum	Flat Fork Fern	-	Endangered	-	CMA	Found in moist tropical areas in Queensland, the Pacific and tropical America. In NSW, there is a historic record for Ballina but it has not been seen for many years and may be extinct in NSW. Grows in moist tropical or subtropical rainforest, or moist eucalypt forest.	This species is considered **unlikely** to occur with the study area.
Pterostylis nigricans	Dark Greenhood	-	Vulnerable	-	CMA	The Dark Greenhood occurs in north-east NSW north from Evans Head, and in Queensland. Coastal heathland with Heath Banksia (Banksia ericifolia), and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils.	This species is considered **unlikely** to occur with the study area.
Pultenaea maritima	Coast Headland Pea	-	Vulnerable	-	CMA	Occurs in New South Wales and Queensland. Within NSW, the species has been recorded from Newcastle north to Byron Bay on 16 headlands. The species occurs in grasslands, shrublands and heath on exposed coastal headlands.	This species is considered **unlikely** to occur with the study area.
Quassia sp. Mooney Creek	Moonee Quassia	-	Endangered	Endangered	CMA	Scattered distribution from the Moonee Creek area north of Coffs Harbour to north-east of Grafton. Shrubby layer below tall moist eucalypt forest and tall dry eucalypt forest, including forest edges, mostly at lower altitudes.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Randia moorei	Spiny Gardenia	-	Endangered	Endangered	CMA; PMST	From Lismore in north-east NSW north to the Logan River in south-east Queensland. Sparsely distributed, with most records in the Tweed and Brunswick areas. Subtropical, riverine, littoral and dry rainforest. In NSW, Hoop Pine and Brush Box are common canopy species.	This species is considered **unlikely** to occur with the study area.
Rapanea sp. Richmond River (J.H.Maiden & J.L.Boorman NSW 26751)	Purple-leaf Muttonwood, Lismore Muttonwood	-	-	Endangered	PMST	Occurs only within the NSW North Coast Bioregion. There are three extant populations of the Ripple-leaf Muttonwood which occur within the Richmond River and Clarence River catchments. One population was found in 1997, located on private property containing a tributary to the Richmond River, near the locality of Tatham. A second population was found in 1998, located in Boatharbour Nature Reserve, adjacent to the Bangalow Road, near the town of Lismore. The largest known population was found in 1999 located in Mallanganee National Park, west of the town of Casino. Populations occur on an upper slope on the western side of the Richmond Range, in the east of the Clarence River catchment. The Boatharbour and Tatham populations occur on the alluvial flats of the floodplains of the Richmond River catchment.	This species is considered **likely** to occur within the study area.
Rhynchosia acuminatissima	Pointed Trefoil	-	Vulnerable	-	CMA	It occurs in Queensland and NSW and is known from only nine locations north of Lismore. Populations are generally small, comprising few individuals scattered over a wide area. Pointed Trefoil is found in or near dry rainforest dominated by Hoop Pine. Other species with which Pointed Trefoil is associated include Brush Box *Lophostemon confertus* , Grey Ironbark *Eucalyptus siderophloia* , Rough-leaved Elm *Ahananthe philipinensis* and Native Holly *Alchornea ilicifolia* .	This species is considered **unlikely** to occur with the study area.
Rotala tripartita		-	Endangered	-	Atlas; CMA	In New South Wales the species is currently known from only two locations, one in the Casino district and one in the South Grafton area. These locations are separated by a distance of less than c. 100 km. A riparian species that grows in free-standing water with sedges. There appear to be extreme fluctuations in abundance of the species, with plants observed to germinate prolifically and establish in large numbers after substantial rainfall. Individuals disappear above-ground during dry periods and may only persist during these times in the soil seed-bank.	This species is considered **likely** to occur within the study area.

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		FM Act	TSC Act	EPBC Act			
Rutidosis heterogama	Heath Wrinklewort	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Scattered coastal locations between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides.	This species is considered **likely** to occur within the study area.
Sarcochilus dilatatus	Brown Butterfly Orchid	-	Endangered	-	CMA	Brown Butterfly Orchid occurs in Queensland and north-east NSW. In NSW it is very rare, with the only recent record being from a single location near Hortons Creek. Grows on trees in littoral rainforest, subtropical rainforest, dry rainforest and streamside forests, mainly at low to medium (up to 500m) altitudes. Plants favour Hoop Pine as a host.	This species is considered **unlikely** to occur with the study area.
Sarcochilus fitzgeraldii	Ravine Orchid	-	Vulnerable	Vulnerable	CMA	North-east NSW, north of the Macleay River, to Maleny in south-east Queensland. The Ravine Orchid grows mainly on rocks, amongst organic matter, in cool, moist, shady ravines, gorges and on cliff faces in dense subtropical rainforest at altitudes between 500 and 700 m. Occasional clumps are found on the bases of fibrous-barked trees.	This species is considered **unlikely** to occur with the study area.
Sarcochilus hartmannii	Hartman's Sarcochilus	-	Vulnerable	Vulnerable	CMA	From the Richmond River in northern NSW to Gympie in south-east Queensland. Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000 m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees.	This species is considered **likely** to occur within the study area.
Sarcochilus weinthalii	Blotched Sarcochilus	-	Vulnerable	Vulnerable	CMA	The coastal and sub-coastal ranges north from the Richmond River in north-east NSW, and also in Queensland. Rainforest and drier scrubs, often in isolated patches, from 400 to 700 m in altitude. Grows on rainforest trees.	This species is considered **unlikely** to occur with the study area.
Senna acclinis	Rainforest Cassia	-	Endangered	-	Atlas; CMA	Occurs in coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland. Grows in or on the edges of subtropical and dry rainforest.	This species is considered **likely** to occur within the study area.

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		FM Act	TSC Act	EPBC Act			
Solanum limitare	Border Ranges Nightshade	-	Endangered	-	CMA	Border Ranges Nightshade occurs from the Bunya Mountains in southern Queensland south to the Kyogle and Urbenville areas in northern NSW. The species has been recorded from about six locations within NSW. However, the majority of these records are pre-1974, with few populations found in recent times, including between Mt Glennie and Mt Lindesay on the edge of the Border Ranges National Park. Border Ranges Nightshade generally occurs in open Blue Gum forest with a grassy understorey.	This species is considered **unlikely** to occur with the study area.
Sophora fraseri	Brush Sophora	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	North from the Casino district in north-east NSW, where it is very rare. Brush Sophora is usually found in moist situations, often near rainforest.	This species is considered **likely** to occur within the study area.
Sophora tomentosa	Silverbush	-	Endangered	-	CMA	Silverbush occurs in coastal areas in Queensland and northern NSW. It was previously common north from Port Stephens but is now uncommon and found only north of Old Bar, near Taree. Silverbush occurs on coastal dunes.	This species is considered **unlikely** to occur with the study area.
Symplocos baeuerlenii	Small-leaved Hazelwood	-	Vulnerable	Vulnerable	CMA	Small-leaved Hazelwood occurs in Nightcap and Mount Jerusalem national parks and in the Tweed and Brunswick Valleys in north-east NSW. It also has a limited occurrence in south-east Queensland. Occurs in warm temperate rainforest on less fertile soils derived from rhyolite.	This species is considered **unlikely** to occur with the study area.
Syzygium hodgkinsoniae	Red Lilly Pilly	-	Vulnerable	Vulnerable	CMA; PMST	A restricted range from the Richmond River in north-east NSW to Gympie in Queensland. Locally common in some parts of its range, but otherwise sparsely distributed. Usually found in riverine and subtropical rainforest on rich alluvial or basaltic soils.	This species is considered **likely** to occur within the study area.
Syzygium moorei	Durobby	-	Vulnerable	Vulnerable	Atlas; CMA	Found in the Richmond, Tweed and Brunswick River valleys in north-east NSW and with limited occurrence in south-east Queensland. Durobby is found in subtropical and riverine rainforest at low altitude. Often occurs as isolated remnant paddock trees. Restricted to within 15 km of eastern boundary of Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA Sub-region.	This species is considered **unlikely** to occur with the study area.

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		FM Act	TSC Act	EPBC Act			
Taeniophyllum muelleri	Minute Orchid, Ribbon-root Orchid	-	-	Vulnerable	PMST	Grows on outer branches and branchlets of rainforest trees; coast and coastal ranges, from sea level to 250 m alt., north from the Bellinger River.	This species is considered **unlikely** to occur with the study area.
Tephrosia filipes	Tephrosia filipes	-	Vulnerable	-	Atlas; CMA	Relatively widespread in QLD but in NSW confined to the north-eastern section from Guy Fawkes River National Park in the south to the Tenterfeid district in the north. LGAs for which the species is known to occur include Tenterfield, Northern Rivers and Glen Innes Severn. Grows in a range of woodland and forest habitats on soils derived from granite, sandstone or metasediments.	This species is considered **likely** to occur within the study area.
Thesium australe	Austral Toadflax	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Occurs in grassland or grassy woodland, often found in damp sites in association with Kangaroo Grass (*Themeda australis*). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.	This species is considered **likely** to occur within the study area.
Tinospora smilacina	Tinospora Vine	-	Endangered	-	Atlas; CMA	Found north from the Coffs Harbour district in north-east NSW, where it is rare. Occurs in dry rainforest and along the boundaries of dry rainforest and dry eucalypt forest.	This species is considered **likely** to occur within the study area.
Tinospora tinosporoides	Arrow-head Vine	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Found north from the Richmond River in north-east NSW, where it is locally common in some parts of its range. Occurs in wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils.	This species is considered **unlikely** to occur with the study area.
Triflorensia cameronii	Cameron's Tarenna	-	Endangered	-	CMA	Rare in south-east Queensland. In NSW only one very small population is known in Lismore. Occurs in the understorey of dry rainforest, on rocky basalt derived soils.	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status FM Act	TSC Act	Common-wealth Status EPBC Act	Source	Distribution and Habitat Requirements	Suitability Outcome
Triplarina imbricata	Creek Triplarina	-	Endangered	Endangered	Atlas; CMA; PMST	Found only in a few locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW. Occurs along watercourses in low open forest with Water Gum (*Tristaniopsis laurina*).	This species is considered **likely** to occur within the study area.
Tylophora linearis		-	Vulnerable	Endangered	PMST	Found in the Barraba, Mendooran, Temora and West Wyalong districts in northern and central western slopes of NSW. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum species* and *Casuarina* species. Not known or predicted to occur within any relevant CMA subregions.	This species is considered **unlikely** to occur with the study area.
Tylophora woollsii	Cryptic Forest Twiner	-	Endangered	Endangered	Atlas; CMA; PMST	Found from the NSW north coast and New England Tablelands to southern Queensland, but is very rare within that range. Grows in moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins. Thought to be wind-dispersed. Has been recorded from a number of locations including; Bald Rock National Park, Marengo State Forest, Sheas Nob State Forest, Clouds Creek State Forest, Ewingar State Forest, Kangaroo River State Forest, Boonoo State Forest, Gibraltar Range National Park and Barrington Tops National Park. Associated species include *Acacia melanoxylon, A. binervata, Caldcluvia paniculata, Ehretica acuminata, Eucalyptus microcorys, E. saligna, Schizomera ovata*, and *Syncarpia* spp. A number of populations occur along disturbed roadside verges.	This species is considered **likely** to occur within the study area.
Uromyrtus australis	Peach Myrtle	-	Endangered	Endangered	CMA	Found only in Nightcap and Mount Jerusalem national parks and Whian Whian State Conservation Area, west of Mullumbimby in far north-east NSW. Occurs in warm temperate rainforest on less fertile soils derived from rhyolite rock. Often associated with Coachwood (*Ceratopetalum apetalum*).	This species is considered **unlikely** to occur with the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Wahlenbergia scopulicola	Rock-face Bluebell	-	Endangered	-	CMA	This Bluebell occurs only in the McPherson Range. Found in crevices in cliffs at high altitudes.	This species is considered **unlikely** to occur with the study area.
Xylosma terrae-reginae	Queensland Xylosma	-	Endangered	-	CMA	In New South Wales it has a restricted distribution north from near Ballina, in the Richmond River district. Found in littoral and subtropical rainforests on coastal sands or soils derived from metasediments.	This species is considered **unlikely** to occur with the study area.
Zieria adenodonta	Wollumbin Zieria	-	Endangered	-	CMA	Occurs only near the top of Mount Warning in the Tweed district. Grows in dense shrubby vegetation on steep rocky slopes, with tea-tree, bottlebrushes and grass-trees.	This species is considered **unlikely** to occur with the study area.

Table 2: Threatened Ecological Communities Habitat Suitability Assessment

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River	Darling River EEC	Endangered Ecological Community	-	-	DII	Includes all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, anabranches, flow diversions to anabranches and the floodplains of the Darling River within NSW, including Menindee Lakes and the Barwon River. Includes the Border Rivers (Macintyre, Severn and Dumaresq Rivers), and regulated tributaries (Gwydir, Namoi, Macquarie, Castlereagh, and Bogan Rivers). Mole River and the Dumaresq River occur in the Study Area West, hence this community will include tributaries of these river systems.	This community was **recorded** within the Project area.
Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South bioregion	Ooline Community	-	Endangered Ecological Community	-	CMA	A forest community dominated by Ooline (*Cadellia pentastylis*). Other canopy species include White Box (*Eucalyptus albens*), Ironbarks (*E. beyeriana* and *E. melanophloia),* Dirty Gum (*E. chloroclada),* Narrow-leaved Grey Box (*E. pilligaensis*), Green Mallee (*E. viridis*) and White Cypress Pine (*Callitris glaucophylla*). The understorey is made up of a range of shrubs such as Wattles and grasses. Extensively cleared and now known from only seven main locations on the North West Slopes in NSW, between Narrabri and the Queensland border, and also in Queensland. Usually occurs on undulating terrain on a variety of soil types, between 300-450 m altitude.	This community was recorded in the broader region, however was **not recorded** within easement.
Coastal Cypress Pine Forest in the New South Wales North Coast Bioregion	Coastal Cypress Pine Forest in the NSW North Coast Bioregion	-	Endangered Ecological Community	-	CMA	Canopy of Coastal Cypress Pine *Callitris columellaris* , sometimes be mixed with eucalypts such as *Eucalyptus intermedia, E.pilularis* or *E. signata* , acacias and *Allocasuarina littoralis* , *Banksia integrifolia* subsp. *integrifolia* or *Banksia serrata* and/or rainforest trees. The understorey of shrubs, sedges and herbs is typically open to sparse. Apparently restricted to the NSW North Coast bioregion. Any occurrence of the community in south-east Queensland is likely to be highly restricted. In NSW, Coastal Cypress Pine Forest is currently known from the local government areas of Tweed, Byron, Ballina, Richmond Valley and Clarence Valley. Currently known occurrences of the community are generally within 35km of the coast and below 100m elevation.	This community is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Coastal Saltmarsh in the New South Wales North Coast; Sydney Basin and South East Corner Bioregions	Coastal Saltmarsh in the NSW North Coast; Sydney Basin and South East Corner Bioregions	-	Endangered Ecological Community	-	CMA	Occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea, Juncus krausii, Sarcocornia quinqueflora, Sporobolus virginicus, Triglochin striata, Isolepis nodosa, Samolus repens, Selliera radicans, Suaeda australis* and *Zoysia macrantha* . Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans.	This community is considered **unlikely** to occur within the study area.
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast; Sydney Basin and South East Corner Bioregions	Freshwater wetlands on coastal floodplains	-	Endangered Ecological Community	-	CMA	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas.	This community was recorded in the broader region, however was **not recorded** within easement.
Fuzzy Box woodland on alluvial soils of the south western slopes, Darling riverine plains and Brigalow belt south bioregions	Fuzzy Box Woodland	-	Endangered Ecological Community	-		Tall woodland or open forest dominated by Fuzzy Box *Eucalyptus conica,* often with Grey Box *Eucalyptus microcarpa,* Yellow Box *Eucalyptus melliodora,* or Kurrajong *Brachychiton populneus.* Buloke *Allocasuarina luehmannii* is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. Occurs on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats.	This community was recorded in the broader region, however was **not recorded** within easement.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion	Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion	-	Endangered Ecological Community	-	CMA	Typically dominated by a tall open tree canopy of eucalypts *Eucalyptus moluccana* and *Eucalyptus propinqua* and, less commonly, Grey Gum Eucalyptus biturbinata, Grey Ironbark Eucalyptus siderophloia and Hoop Pine Araucaria cunninghamii. Typically occurs on the escarpment slopes and foothills of north-eastern NSW, most commonly between 200 and 500m elevation. Soils that support the community are relatively fertile and derived from a range of igneous (including acid volcanic, basic volcanic and intrusive igneous) or fine-grained sedimentary rocks.	This community is considered **unlikely** to occur within the study area.
Littoral Rainforest in the New South Wales North Coast; Sydney Basin and South East Corner Bioregions	Littoral Rainforest in the NSW North Coast; Sydney Basin and South East Corner Bioregions	-	Endangered Ecological Community	Critically Endangered Ecological Community	CMA	Generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Occurs only on the coast. Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets. Stands are generally taller in sheltered sites such as hind dunes, although wind-pruning may still occur on their windward sides. Most stands occur within two kilometres of the sea, though are occasionally found further inland within reach of the maritime influence.	This community is considered **unlikely** to occur within the study area.
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion	Lowland Rainforest on Floodplain	-	Endangered Ecological Community	-	CMA	Generally occupies riverine corridors and alluvial flats with rich, moist silts often in subcatchments dominated by basic volcanic substrates. Major examples once occurred, and remnants remain, on the floodplains of the Tweed, Richmond, Clarence, Bellinger, Macleay, Hastings, Manning, and Hunter Rivers. Other minor river systems also support the community. This community occurs on fertile soils in lowland river valleys.	This community is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Montane Peatlands and Swamps of the New England Tableland; NSW North Coast; Sydney Basin; South East Corner; South Eastern Highlands and Australian Alps bioregions	Montane Peatlands and Swamps	-	Endangered Ecological Community	Critically Endangered Ecological Community (listed as Alpine Sphagnum Bogs and Associated Fens - slightly different to NSW TSC Act listing)	CMA	Montane Peatlands and Swamps comprises a dense, open or sparse layer of shrubs with soft-leaved sedges, grasses and forbs. Associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaux, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite.	This community is considered **unlikely** to occur within the study area.
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	-	Critically Endangered Ecological Community	PMST	Distributed mainly in the Darling Downs of southern Queensland and the Liverpool Plains and Moree Plains of northern NSW. Occurrence is mainly associated with fine textured, often cracking clay soils derived from either basalt or alluvium. Occurs on landforms that are typically flat to very low slopes (less than 5 percent/1degree). Tree canopy usually absent to sparse. The ground layer is typically dominated by perennial native grasses. Extends from Chinchilla, Queensland to Dubbo, NSW. Three major but disjunct occurrences; the Darling Downs west of Toowoomba, QLD, the Liverpool Plains around Gunnedah, NSW, and the Moree Plains north-west of Moree, NSW.	This community was **recorded** within the Project area.
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	-	Threatened Ecological Community	-	CMA	Dominated by trees of New England Peppermint *Eucalyptus nova-anglica* and occasionally Mountain Gum *E. dalrympleana* subsp. *heptantha.* In NSW all sites are within the New England Tablelands. This community is or has been known to occur in the Armidale Dumaresq, Guyra, Inverell, Severn and Tenterfield LGAs. The community occurs primarily in valley flats subject to cold air drainage. The valley flats are composed of basaltic soils, fine-grained sedimentary and acid volcanic substrates with poorly drained loam-clay soils.	This community was recorded in the broader region, however was **not recorded** within easement.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion	Sub-tropical Coastal Floodplain Forest	-	Endangered Ecological Community	-	CMA	Occurs on the coastal floodplains of the North Coast of NSW. It has a tall open tree layer of eucalypts including *Eucalyptus tereticornis, E. siderophloia* and *Corymbia intermedia*. Occupies central or marginal parts of floodplains and sandy flats, including Pleistocene back-barrier flats; habitats where flooding is periodic and soils are rich in silt and sand, sometimes humic, and show little influence of saline ground water. Associated with clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m, but may occur on localised river flats up to 250 m elevation. May form mosaics with other floodplain forest communities and treeless wetlands, and often fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	This community was **recorded** within the Project area.
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast; Sydney Basin and South East Corner Bioregions	Swamp sclerophyll forest on coastal floodplains	-	Endangered Ecological Community	-	CMA	Has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 m (though sometimes up to 50 m) elevation. The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil, and latitude.	This community was **recorded** within the Project area.
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast; Sydney Basin and South East Corner Bioregions	Themeda Grassland on seacliffs and coastal headlands in the NSW North Coast; Sydney Basin and South East Corner bioregions	-	Endangered Ecological Community	-	CMA	Themeda australis is the dominant species. Found on a range of substrates in the NSW North Coast, Sydney Basin and South East Corner bioregions. The community is found on a range of substrates, although stands on sandstone are infrequent and small. Larger stands are found on old sand dunes above cliffs, for example at Cape Banks and Henry Head in Botany Bay National Park, and on basalt headlands.	This community is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion	Upland Wetlands of the Drainage Divide of the New England Tablelands	-	Endangered Ecological Community	Endangered Ecological Community	CMA	Composed of a series of high altitude wetlands in the New England Tablelands of Northern NSW. The wetlands have small local catchments, and range from shallow and temporary to near-permanent wetlands. Generally above 900m altitude and associated with basalt soils. Not connected to river systems by floodplains.	This community is considered **unlikely** to occur within the study area.
Weeping Myall Woodlands	Weeping Myall Woodlands	-	Endangered Ecological Community (listed as Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregionst)	Endangered Ecological Community	PMST	Generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded. The ecological community occurs on black, brown, red-brown or grey clay or clay loam soils. Occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Queensland. The distribution in northern NSW was likely to have been more patchy, with the largest continuous area extending northwest of Wee Waa from Merrywinebone and Rowena west to Walgett.	This community is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Box Gum Woodland	-	Endangered Ecological Community	Critically Endangered Ecological Community	PMST	Found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The understorey in intact sites is characterised by native grasses and a high diversity of herbs. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant.	This community was **recorded** within the Project area.
White Gum Moist Forest in the NSW North Coast bioregion	White Gum Moist Forest in the NSW North Coast bioregion	-	Endangered Ecological Community	-	CMA	Typically has a tall open canopy of eucalypts. The community is dominated by White Gum *Eucalyptus dunnii.* Occurs on the escarpment slopes and foothills of the north-east NSW, most commonly between 400 and 650 m elevation. Soils that support the community are relatively fertile and derived from basalt or fine-grained sediments, or colluvium or alluvium influenced by the presence of these substrates upslope or upstream. The community is typically found in gullies and on lower slopes, but has been recorded on upper slopes and basalt ridges. It occurs less commonly on west-facing slopes than on other aspects.	This community is considered **unlikely** to occur within the study area.

Table 3: Threatened Fauna Habitat Suitability Assessment

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Aepyprymnus rufescens	Rufous Bettong	-	Vulnerable	-	Atlas; CMA	The original range from Coen in north Queensland to central Victoria has been reduced to a patchy distribution from Cooktown, Queensland, to north-eastern NSW as far south as Mt Royal National Park. In NSW it has largely vanished from inland areas but there are sporadic, unconfirmed records from the Pilliga and Torrington districts. Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Amaurornis olivaceus	Bush-hen	-	Vulnerable	-	Atlas; CMA	The Pale-vented Bush-hen occurs mainly in coastal and subcoastal regions from the Top End of the Northern Territory and Cape York Peninsula south through eastern Queensland to north-eastern NSW. In NSW, Bush-hens are an apparently uncommon resident from the Queensland border south to the Clarence River. Key elements of their habitat are dense undergrowth 2-4 m tall and within 300 m of water. They have been known to occur in secondary forest growth, rank grass or reeds, thickets of weeds, such as Lantana (*Lantana camara*), and pastures, crops or other farmland, such as crops of sugar cane, and grassy or weedy fields, or urban gardens where they border forest and streams or wetlands, such as farm dams. Within the Northern Rivers CMA, this species is known within the Clarence Lowlands, Richmond – Tweed and Woodenbong sub-regions.	This species is considered **likely** to occur within the study area.
Anomalopus mackayi	Five-clawed Worm-skink	-	Endangered	Vulnerable	CMA	This species has a patchy distribution on the North West Slopes and Plains of north-east NSW and south-east Queensland. The species is found close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees. It is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. Species occurs to the west of the study area.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Anseranas semipalmata	Magpie Goose	-	Vulnerable	-	Atlas; CMA	The Magpie Goose had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. It is mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Within the Northern Rivers CMA, it is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond – Tweed and Woodenbong sub-regions.	This species is considered **likely** to occur within the study area.
Argyreus hyperbius	Laced Fritillary	-	Endangered	-	CMA	In Australia, this species is found in coastal areas of north-east NSW and south-east Queensland. The Australian population is now restricted to a few widely separated localities from Port Macquarie north to Gympie. The Laced Fritillary has only been recorded from the Port Macquarie and Billinudgel/Byron Bay areas in NSW in recent times. It occupies open swampy coastal habitat. This species is known within the Northern Rivers CMA, however its distribution within the relevant sub-regions is restricted to within 15 km of the coast.	This species is considered **unlikely** to occur within the study area.
Assa darlingtoni	Pouched Frog	-	Vulnerable	-	Atlas; CMA	This species is described as a relict species occupying disparate and restricted mesic forest refugia mainly within north-east NSW but also extending into far south-east Queensland. Pouched frogs live in cool, moist rainforest, including Antarctic Beech, or moist eucalypt forest in mountainous areas, mostly above 800 m. This species is known within the Northern Rivers CMA subcatchment areas of the Richmond - Tweed and Woodenbong, however none of the five isolated populations (Dorrigo Plateau, Gibraltar Range, Border Ranges and two in south-east Queensland) are located close to the study area.	This species is considered **unlikely** to occur within the study area.
Atrichornis rufescens	Rufous Scrub-bird	-	Vulnerable	-	Atlas; CMA	The Rufous Scrub-bird is endemic to far south-eastern Queensland and north-eastern NSW. The species is now generally only found in high-rainfall areas above 600 metres above sea level, but formerly occurred in lowland habitats of the Richmond and Tweed River basins. Their habitat is predominately rainforest, including subtropical, warm temperate and cool temperate rainforests, moist and wet eucalypt forests and mixed eucalypt-rainforest vegetation types. The species is known to occur within the Richmond-Tweed sub-region of the Northern Rivers Catchment, however its known or predicted distribution elsewhere across the study area is restricted.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Bidyanus bidyanus	Silver Perch	-	Vulnerable *	-	DII	Silver perch were once widespread and abundant throughout most of the Murray-Darling river system. They have now declined to low numbers or disappeared from most of their former range. Silver perch seem to prefer fast-flowing, open waters, especially where there are rapids and races, however they will also inhabit warm, sluggish water with cover provided by large woody debris and reeds. There are no records for this species within the Border Rivers/Gwydir or Northern Rivers CMAs.	This species is considered **unlikely** to occur within the study area.
Botaurus poiciloptilus	Australasian Bittern	-	Vulnerable	-	Atlas; CMA	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. The species favours permanent freshwater wetlands with tall, dense vegetation particularly bull rushes and spike rushes. The species breeds and foraging in emergent vegetation in freshwater or brackish waters. It occurs within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Burhinus grallarius	Bush Stone-curlew	-	Endangered	-	Atlas; CMA	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. The Bush Stone-curlew is found in open forests and woodlands with a sparse grassy ground layer and fallen timber. The species breeds and forages in grassy woodland and fallen dead timber. The species is known to occur in the Stanthorpe Plateau and Clarence Lowlands sub-regions of the Northern Rivers CMA. It is also predicted to occur in the Nandewar Northern Complex sub-region of the Border Rivers/ Gwydir CMA.	This species is considered **likely** to occur within the study area.
Cacophis harriettae	White-crowned Snake	-	Vulnerable	-	Atlas; CMA	This species is found across coastal and near-coastal areas from central eastern Queensland south to the vicinity of Coffs Harbour in north-east NSW. Their stronghold appears to be the middle Clarence Valley. The species favours low to mid-elevation dry eucalypt forest and woodland and is occasionally found in moist eucalypt forest and coastal heathland. The species is known in the following sub-regions of the Northern Rivers CMA: Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong. Predicted within the Cataract sub-region.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Calidris alba	Sanderling	-	Vulnerable	-	CMA	This species is a migratory bird to most of the Australian coastline. Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. This species distribution is restricted to within 2 km of coast.	This species is considered **unlikely** to occur within the study area.
Calidris tenuirostris	Great Knot	-	Vulnerable	-	CMA	In NSW, the Great Knot has been recorded at scattered sites along the coast to about Narooma. It occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. This species distribution is restricted to within 2 km of coast.	This species is considered **unlikely** to occur within the study area.
Calyptorhynchus banksii banksii	Red-tailed Black-Cockatoo (coastal subspecies)	-	Critically Endangered	-	CMA	The Red-tailed Black-Cockatoo is now confined to northern and eastern coastal Queensland and, possibly, far north-eastern NSW. Only four apparently valid records between 1980 and July 2009 exist for this species, all in the far north-east of the state: in the Tweed and Richmond Valleys: at Bungawalbin Nature Reserve, Round Mountain (Bogangar), Wilsons Creek (north of Alstonville), and at Cabarita. In north-eastern NSW, the species has been reported from dry open forest and mixed rainforest-eucalypt forest. It is known in the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo	-	Vulnerable	-	Atlas	The Red-tailed Black Cockatoo (inland subspecies) is known to occur around watercourses and overflows of the Darling, Paroo, Bogan, Macquarie and Barwon Rivers extending in an arc along the Darling River from Wentworth in the south to Bourke and thence through to Brewarrina in the north. It extends east to Walgett and perhaps Boggabilla on the Barwon and south through to the Macquarie Marshes. The inland subspecies prefers Eucalyptus forest and woodlands, particularly river red gum and coolabah lined water courses. This subspecies is not known or predicted to occur within any CMA sub-region through which the study area passes.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	Vulnerable	Endangered (only the South Australian sub-species)	Atlas; CMA	The Glossy Black-Cockatoo is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species. It is known to occur within the relevant sub-regions of the Northern Rivers and Border Rivers/Gwydir CMAs.	This species is considered **likely** to occur within the study area.
Carcharadon carcharias	Great White Shark	Vulnerable	-	-	DII	Great white sharks are found throughout the world in temperate and subtropical oceans, with a preference for cooler waters. Great white sharks are normally found in inshore waters around rocky reefs and islands, and often near seal colonies. They have been recorded at varying depths down to 1200m.	This species is considered **unlikely** to occur within the study area.
Carcharius taurus	Grey Nurse Shark	Critically Endangered	-	-	DII	Grey nurse sharks are a large shark native to subtropical to cool temperate waters in the Mediterranean Sea and the Atlantic, Indian and western Pacific Oceans. Once widely distributed, they are now mainly restricted to Australia and the east coasts of the USA, Uruguay, Argentina and South Africa.	This species is considered **unlikely** to occur within the study area.
Caretta caretta	Loggerhead Turtle	-	Endangered	Endangered	CMA	Loggerhead Turtles are found in tropical and temperate waters off the Australian coast. In NSW they are seen as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The species occurs within relevant sub-regions of the Northern Rivers CMA, however it is restricted to within 250m of high tide mark.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Cercartetus nanus	Eastern Pygmy-possum	-	Vulnerable	-	Atlas; CMA	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extents from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. The species is predicted to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA and the Cataract, Clarence Lowlands, Clarence Sandstones of the Northern Rivers CMA, and known with the Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong subregions (Northern Rivers CMA).	This species is considered **likely** to occur within the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. They roost in caves, cliff crevices, old mine workings or in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel) in proximity to mid-elevation dry open forest and woodland. The species is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Chalinolobus nigrogriseus	Hoary Wattled Bat	-	Vulnerable	-	Atlas; CMA	The Hoary Wattled Bat is widely distributed across northern Australia although absent from the arid centre. In north east NSW it reaches the lower Clarence and Richmond River areas, extending from near Murwillumbah in the north, south to between Grafton and Coffs Harbour. In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. It is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. It is predicted to occur within the Cataract and Stanthorpe Plateau sub-regions of the Northern Rivers CMA, and known within the following Northern Rivers sub-regions: Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge and Woodenbong.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Chalinolobus picatus	Little Pied Bat	-	Vulnerable	-	CMA	The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. This species inhabits dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, or Bimbil box. They utilise caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings as roosting sites. The species is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA, however the western extent of the proposed line is beyond the eastern distribution of the species as indicated by Atlas records.	This species is considered **unlikely** to occur within the study area.
Charadrius leschenaultii	Greater Sand-plover	-	Vulnerable	-	CMA	The Greater Sand-plover is almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. The species is restricted to within 5 km of coast in the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Charadrius mongolus	Lesser Sand-plover	-	Vulnerable	-	CMA	In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Almost entirely coastal in NSW favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, it occasionally occurs on sandy beaches, coral reefs and rock platforms. The species is restricted to within 5 km of coast in the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Circus assimilis	Spotted Harrier	-	Vulnerable	-	Atlas; CMA	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges. The species 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. This species is known to occur within in all of the relevant sub-regions of the Northern Rivers CMA and the Tenterfield Plateau sub-region of the Border Rivers/ Gwydir CMA, and is also predicted to occur within the Nandewar Northern Complex of the latter CMA area.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	Vulnerable	-	Atlas; CMA	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. This species is known to occur within in all of the relevant sub-regions of the Northern Rivers and the Border Rivers/ Gwydir CMAs. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The Three-toed Snake-tooth Skink occurs on the coast and ranges from the Macleay valley in NSW to south-eastern Queensland. It inhabits rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. It is predicted to occur within the Cataract sub-region and known to occur within the Clarence Lowlands, Richmond - Tweed, Rocky River Gorge, and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Coracina lineata	Barred Cuckoo-shrike	-	Vulnerable	-	Atlas; CMA	The Barred Cuckoo-shrike is distributed along Coastal eastern Australia from Cape York to the Manning River in NSW. Barred Cuckoo-shrikes are generally uncommon in their range, and are rare in NSW. They occur within rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. The species is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Crinia tinnula	Wallum Froglet	-	Vulnerable	-	Atlas; CMA	Wallum Froglets are found only in acid paper bark swamps of coastal areas. In NSW the species extends from north of the Queensland border south to Kurnell. The species prefers moist microhabitats in swamps wet or dry heaths, sedges and grasslands for breeding and foraging. The species is known to occur within the Clarence Lowlands and Richmond - Tweed CMA subregions, however the species is geographically restricted to within 30 km and 10km of the coast respectively.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Cyclopsitta diophthalma coxeni	Coxen's Fig-Parrot	-	Critically Endangered	Endangered	Atlas; CMA; PMST	The Coxen's Fig-Parrot is limited to about five populations scattered between Bundaberg in Queensland and the Hastings River in NSW. Usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. Also found in the wetter lowland rainforests that are now largely cleared in NSW. Within the Northern Rivers CMA, it is known and predicted to occur within the Richmond - Tweed subregions (Part A and B respectively) and known in the Woodenbong sub-region.	This species is considered **likely** to occur within the study area.
Daphoenositta chrysoptera	Varied Sittella	-	Vulnerable	_	Atlas	Varied Sitellas are endemic and widespread in mainland Australia. Varied Sitellas are found in eucalypt woodlands and forests throughout their range. They prefer rough-barked trees like stringybarks and ironbarks or mature trees with hollows or dead branches.	This species is considered **likely** to occur within the study area.
Dasyornis brachypterus	Eastern Bristlebird	-	Endangered	Endangered	Atlas; CMA; PMST	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. There are now only four populations in the southern Queensland/northern NSW area with a total of 35 birds. Habitat is characterised by dense, low vegetation 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. The species is known in the Richmond - Tweed sub-region of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Dasyurus maculatus	Spotted-tailed Quoll	-	Vulnerable	Endangered	Atlas; CMA; PMST	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. The Spotted-tailed Quoll has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. It is known to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA, and known to occur within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Delma torquata	Collared Delma	-	-	Vulnerable	PMST	The Collared Delma is restricted to the Brigalow Belt in Queensland. It normally inhabits eucalypt or acacia dominated woodland and open forest where it is associated with suitable microhabitats (exposed rocky outcrops, or a sparse understorey of tussock grass, shrubs or semi-evergreen vine thickets).	This species is considered **unlikely** to occur within the study area.
Dermochelys coriacea	Leathery Turtle	-	Vulnerable	Vulnerable	CMA	This species is found throughout the world's tropical and temperate seas and in all coastal waters of Australia. It occurs in inshore and offshore marine waters. It occurs within areas of the Northern Rivers CMA which extend to the coastline, however the study area is at least 40km inland.	This species is considered **unlikely** to occur within the study area.
Elseya belli	Bell's Turtle	-	Vulnerable	Vulnerable	CMA; PMST	In NSW, this species is currently found only in the upper reaches of the Namoi and Gwydir River systems, on the escarpment of the North West Slopes. A separate population exists in Queensland. It inhabits shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. It is known to occur within the Stanthorpe Plateau sub-region of the Northern Rivers CMA, within 5km of Bald Rock NP. Species occurs south of the study area.	This species is considered **unlikely** to occur within the study area.
Ephippiorhynchus asiaticus	Black-necked Stork	-	Endangered	-	Atlas; CMA	Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia, south to central-eastern NSW and with vagrants recorded at scattered sites well away from the coast (for example, near Moree, north-east of Hay and in Victoria). In NSW, the species becomes increasingly uncommon south of the Northern Rivers region. They are found are mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation. Known within the Nandewar, Northern Complex subregion of the Border Rivers/Gwydir CMA and known to occur within relevant sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Epinephelus daemelii	Black Cod	-	Vulnerable *	-	DII	Black cod, also known as black rockcod or black-saddled rockcod, are a large, reef-dwelling, carnivorous grouper species. They are found in warm temperate and subtropical parts of the south-western Pacific, and naturally occurred along the entire NSW coast including Lord Howe Island.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Erythrotriorchis radiatus	Red Goshawk	-	Critically Endangered	-	Atlas; CMA	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers. It is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Esacus neglectus	Beach Stone-curlew	-	Critically Endangered	-	CMA	In NSW, the species occurs regularly to about the Manning River, and the small population of north-eastern NSW is at the limit of the normal range of the species in Australia. Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They are restricted to with 2km of the coast within the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	Vulnerable	-	Atlas; CMA	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. It is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is also known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Furina dunmalli	Dunmall's Snake	-	_	Vulnerable	CMA	This species occurs in south-east interior of Queensland, including the Darling Downs, and is thought to potentially extend into inland north-eastern NSW. Most locality records are between 200 and 500 m elevation. The preferred habitat for this species is Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. It also occurs in eucalypt and Callitris woodland with fallen timber and ground litter. It is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. Species occurs to the west and north of the study area.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Geophaps scripta	Squatter Pigeon	-	Endangered	-	CMA	This species is found from north Queensland to the North West Slopes of NSW and extending down to the Liverpool Plains and Dubbo. Today they are very rare in the southern parts of their range. They occur within grassy woodland habitats and plains, preferring sandy areas and usually close to water. This species is known in the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA.	This species is considered **likely** to occur within the study area.
Geophaps scripta scripta	Squatter Pigeon (southern)	-	-	Vulnerable	PMST	The Squatter Pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its distribution extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone), and south to scattered sites throughout south-eastern Queensland. It occurs mainly in grassy woodlands and open forests that are dominated by eucalypts. There have been no confirmed records of the Squatter Pigeon (southern) in New South Wales since the 1970s.	This species is considered **unlikely** to occur within the study area.
Glossopsitta pusilla	Little Lorikeet	-	Vulnerable	-	Atlas; CMA	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. They forage primarily in the canopy of open Eucalyptus forest and woodland, and also find food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used by this species. Known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA, as well as the Clarence Lowlands, Clarence Sandstones, Cataract, Richmond - Tweed, Stanthorpe Plateau, Rocky River Gorge and Woodenbong sub-regions of the Northern Rivers CMA. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Grantiella picta	Painted Honeyeater	-	Vulnerable	-	Atlas; CMA	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. It inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. It is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, known within the Rocky River Gorge sub region and predicted within the Stanthorpe Plateau sub-region of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Grus rubicunda	Brolga	-	Vulnerable	-	Atlas; CMA	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It still abundant in the northern tropics, but very sparse across the southern part of its range. Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, however they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. They are known within the Clarence Lowlands, Clarence Sandstones and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Haematopus fuliginosus	Sooty Oystercatcher	-	Vulnerable	-	CMA	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. They favour rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. They are restricted to within 5 km of coast within the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Haematopus longirostris	Pied Oystercatcher	-	Endangered	-	CMA	The Pied Oystercatcher is distributed around the entire Australian coastline. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. This species favours intertidal flats of inlets and bays, open beaches and sandbanks. They are restricted to within 5 km of coast within the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Hieraaetus morphnoides	Little Eagle	-	Vulnerable	-	Atlas; CMA	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. The species occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. It is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Hoplocephalus bitorquatus	Pale-headed Snake	-	Vulnerable	-	Atlas; CMA	This species has a patchy distribution from north-east Queensland to north-east NSW. It is found mainly in dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. The species is known within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. It is predicted in the Cataract and Stanthorpe Plateau sub-regions of the Northern Rivers CMA, and known to occur within these other sub-regions relevant to the study area: Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong.	This species is considered **likely** to occur within the study area.
Hoplocephalus stephensii	Stephens' Banded Snake	-	Vulnerable	-	Atlas; CMA	This species is distributed along the coast and ranges from Southern Queensland to Gosford in NSW. It occupies rainforest and eucalypt forests and rocky areas up to 950 m in altitude. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Irediparra gallinacea	Comb-crested Jacana	-	Vulnerable	-	Atlas; CMA	The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW. They inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. They are known to occur in the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Ixobrychus flavicollis	Black Bittern	-	Vulnerable	-	Atlas; CMA	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. In NSW, records of the species are scattered along the east coast. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. The species is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Kerivoula papuensis	Golden-tipped Bat	-	Vulnerable	-	Atlas; CMA	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It is found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. It is also recorded in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests. It is known to occur in the following Northern Rivers CMA sub-regions: Cataract, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong, and predicted also within the Clarence Lowlands sub-region.	This species is considered **likely** to occur within the study area.
Lathamus discolor	Swift Parrot	-	Endangered	Endangered	Atlas; CMA; PMST	This species migrates to the Australian south-east mainland between March and October. In NSW mostly occurs on the coast and south west slopes. They occur in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. 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. Predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known in the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Stanthorpe Plateau sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Lichenostomus fasciogularis	Mangrove Honeyeater	-	Vulnerable	-	CMA	The Mangrove Honeyeater is confined to the coastal fringe and offshore islands of eastern Australia, from Townsville, Queensland, south to the northern coast of NSW. In NSW, most observations occur south to the Clarence River: around Tweed Heads, near Broken Head, and in the estuary of the Clarence River, near Iluka and Yamba. The primary habitat of the species is mangrove woodlands and shrublands but Mangrove Honeyeaters also range into adjacent forests, woodlands and shrublands, including casuarina and paperbark swamp forests and associations dominated by eucalypts or banksias. They are known to occur within the Northern Rivers CMA but are restricted to 10km from the coast.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Limicola falcinellus	Broad-billed Sandpiper	-	Vulnerable	-	CMA	In Australia, Broad-billed Sandpipers overwinter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. They are known to occur within the Clarence Lowlands of the Northern Rivers CMA but are restricted to tidal influenced water bodies within 15 km of coast.	This species is considered **unlikely** to occur within the study area.
Limosa limosa	Black-tailed Godwit	-	Vulnerable	-	Atlas; CMA	In NSW, the it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the north and south coast, and inland. The species has been recorded within the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state. It is primarily a coastal species, usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. It is known in the Clarence Lowlands sub-region of the Northern Rivers CMA with no known geographic restrictions.	This species is considered **likely** to occur within the study area.
Litoria aurea	Green and Golden Bell Frog	-	Endangered	Vulnerable	CMA	This species was formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria and into east Gippsland. There are no known records from north of Grafton after 1986. Most populations are small, coastal, or near coastal populations. This species inhabits marshes, dams and stream-sides. Optimum habitat includes water-bodies that are unshaded, free of predatory fish, have a grassy area nearby and diurnal sheltering sites available. The species is known to occur in the Clarence lowlands of the Northern Rivers CMA. Specific vegetation communities relevant to the species in the study area include Coastal floodplain sedgelands, rushlands, and forblands and Swamp Box swamp forest.	This species is considered **unlikely** to occur within the study area.
Litoria booroolongensis	Booroolong Frog	-	Endangered	Endangered	CMA	The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. The species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. The species is predicted to occur in the Stanthorpe Plateau and Clarence Sandstones sub-regions of the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Litoria brevipalmata	Green-thighed Frog	-	Vulnerable	-	Atlas; CMA	This species is found in isolated localities along the coast and ranges from the NSW central coast to south-east Queensland. Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. This species is known to occur within rainforest and adjacent eucalyptus forests of the Clarence Lowlands and Sandstone sub-regions of the Northern Rivers CMA. It is also known in the Cataract, Richmond - Tweed and Woodenbong sub regions.	This species is considered **likely** to occur within the study area.
Litoria olongburensis	Olongburra Frog	-	Vulnerable	Vulnerable	CMA	This frog is known to inhabit coastal areas from Fraser Island in south-east Queensland to Woolgoolga in northern NSW. It inhabits paperbark swamps and sedge swamps of the coastal “wallum” country; Banksia dominated lowland heath ecosystem characterised by acidic waterbodies. The species known distribution includes the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA, but it is restricted to within 10 km of the coast.	This species is considered **unlikely** to occur within the study area.
Litoria piperata	Peppered Frog	-	Critically Endangered	Vulnerable	Atlas; CMA	The species has been previously found on the New England Tablelands from south of Armidale to the Gibraltar Range, at an altitude of 800 to 1000 m. Its habitat is streamside vegetation and under rocks and fallen timber along rocky streams flowing eastward from the Tablelands. It is predicted to occur within the Stanthorpe Plateau subregion of the Northern Rivers CMA, restricted to elevations above 800m.	This species is considered **likely** to occur within the study area.
Litoria subglandulosa	Glandular Frog	-	Vulnerable	-	Atlas; CMA	The Glandular Frog is found predominately in the headwaters of coastal rivers in a narrow band along the eastern edge of the escarpment north from the Barrington Tops area to north of the Queensland border with occasional records just to the west of the Great Divide. Glandular Frogs may be found along streams in rainforest, moist and dry eucalypt forest or in subalpine swamps. The Glandular Frog is known in the Rocky River Gorge and Stanthorpe Plateau sub regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Lophoictinia isura	Square-tailed Kite	-	Vulnerable	-	Atlas; CMA	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. It is known within relevant subregions of the Border Rivers/Gwydir CMA, and predicted and known within a number of sub-regions of the Northern Rivers CMA through which the study area passes.	This species is considered **likely** to occur within the study area.
Maccullochella ikei	Eastern Freshwater Cod	Endangered	-	Endangered	DII	Eastern freshwater cod were once abundant in both the Clarence and Richmond River systems. Wild fish are now currently considered to be extinct in the Richmond River system, and very rare or absent in the major northern tributaries of the Clarence River system. Eastern freshwater cod are often found in clear, flowing streams with rocky beds and deep holes. They are generally found in areas that have plenty of boulders or large woody debris (snags). Riparian vegetation, large boulders and snags provide a complex array of habitats for each stage of the cod life cycle and influence the quality and quantity of food and shelter. There are no records for this species within the Border Rivers/Gwydir or Northern Riverns CMAs.	This species is considered **unlikely** to occur within the study area.
Maccullochella peelii peelii	Murray Cod, Cod, Goodoo	-	-	Vulnerable	PMST	The Murray Cod is found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Its range throughout the Basin includes South Australia, Victoria, NSW, ACT and Queensland. Historically the species occurred throughout the entire Basin, with the exception of the upper reaches of some tributaries. It still occurs throughout most of the Basin with the exception of some localised extinctions. The Murray Cod has the ability to live in a diverse range of habitats, including clear rocky streams (such as those found in the upper western slopes of NSW), to slow flowing, turbid rivers and billabongs. There are numerous recent records of this species within the Border Rivers/Gwydir CMA in proximity of the study area.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Macropus dorsalis	Black-striped Wallaby	-	Endangered	-	Atlas; CMA	From the Townsville area in Queensland to northern NSW where it occurs on both sides of the Great Divide. On the north west slopes of NSW it occurs in Brigalow remnants to south of Narrabri. On the north coast it is confined to the upper catchments of the Clarence and Richmond Rivers. The preferred habitat is characterised by dense woody or shrubby vegetation occurring near a more open, grassy area to provide suitable feeding habitat. It is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA, and known to occur within the Cataract, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Macropus parma	Parma Wallaby	-	Vulnerable	-	Atlas; CMA	This species once occurred from north-eastern NSW to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to the Queensland border. Its preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. It is known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Melanodryas cucullata	Hooded Robin	-	Vulnerable	-	Atlas	The Hooded Robin (Tiwi Islands) is restricted to the Tiwi Islands, which consist of Bathurst Island and Melville Island.	This species is considered **unlikely** to occur within the study area.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	Vulnerable	-	Atlas; CMA	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. They prefer lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. Known within the Cataract, Clarence Lowlands, Clarence Sandstones, Stanthorpe Plateau subregions of the Northern Rivers CMA, and predicted to occur within the Rocky River Gorge sub-region.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	-	Vulnerable	-	Atlas; CMA	The eastern subspecies extends south from central QLD through NSW, VIC into south eastern SA. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Inland Grey Box, Yellow Box and Forest Red Gum. It also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. Known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is predicted to occur within the Cataract, Rocky River Gorge and Stanthorpe Plateau subregions of the Northern Rivers CMA, as well as being known within the Clarence Lowlands, Clarence Sandstones and Woodenbong subregions.	This species is considered **likely** to occur within the study area.
Menura alberti	Albert's Lyrebird	-	Vulnerable	-	Atlas; CMA	Albert's Lyrebird is restricted to a small area of far south-eastern Queensland and north-eastern NSW. In NSW, it is mainly found in the McPherson and Tweed Ranges. This species mainly occur in the wettest rainforests or wet sclerophyll forests with a wet understorey, often of rainforest plants. It is known to occur within the region of the Clarence Lowlands relevant to the study area as well as the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Miniopterus australis	Little Bentwing-bat	-	Vulnerable	-	Atlas; CMA	This species is found along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. It inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. It is known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. **This species was "probably" recorded within the study area using Anabat software**.	This species is considered likely to occur within the study area. This species was observed during URS surveys of the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	-	Vulnerable	-	Atlas; CMA	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. They are known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. **This species was "possibly" recorded within the study area using Anabat software**.	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Mixophyes balbus	Stuttering Frog	-	Endangered	Vulnerable	Atlas; CMA; PMST	Stuttering Barred Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have undergone considerable range contraction in NSW, particularly in south-east NSW. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. They breed in streams during summer after heavy rain. Within the Northern Rivers Catchment Management Area, the species is predicted to occur within the Cataract sub- region and known in the Rocky River Gorge and Stanthorpe Plateau sub-regions.	This species is considered **likely** to occur within the study area.
Mixophyes fleayi	Fleay's Barred Frog	-	Endangered	Endangered	CMA; PMST	This species has a restricted distribution on the eastern side of the ranges in south-east Queensland and northeast NSW. The species prefers rainforest and wet eucalypt forest of the escarpment and foothills, usually close to gravely streams. Known to occur in the Northern Rivers CMA, however restricted to Bonalbo (20 km north of the transmission line) within the Woodenbong sub-catchment, and north of Kyogle (approximately 30 km north) within the Richmond - Tweed sub-catchment area.	This species is considered **unlikely** to occur within the study area.
Mixophyes iteratus	Giant Barred Frog	-	Endangered	Endangered	Atlas; CMA; PMST	This species occurs along the coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. North-eastern NSW, particularly the Coffs Harbour-Dorrigo area, is now a stronghold. Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. Within the Northern Rivers Catchment Management Area, the species is known to occur within the Cataract, Clarence lowlands, Clarence Sandstone, Richmond - Tweed, Rocky River Gorge and Woodenbong sub-regions.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Mogurnda adspersa	Purple Spotted Gudgeon	Endangered	-	-	DII	Purple spotted gudgeons occur in inland drainages of the Murray-Darling basin as well as coastal drainages of northern NSW and Queensland. The western population of the purple spotted gudgeon was previously widespread in the Murray, Murrumbidgee and Lachlan River systems and tributaries of the Darling, but has experienced a significant decline in recent times. Purple spotted gudgeons are found in slow-moving or still waters of rivers, creeks and billabongs, often amongst weeds, rocks or large woody debris (snags). There are records of this species within the Border Rivers/Gwydir CMA in proximity of the study area- Tenterfield Creek and Deadman Ck.	This species is considered **likely** to occur within the study area.
Monarcha leucotis	White-eared Monarch	-	Vulnerable	-	Atlas; CMA	The species is endemic to the coastal lowlands and eastern slopes of the Great Divide of eastern Australia, extending from Cape York Peninsula south to north-eastern NSW. In NSW, White-eared Monarchs are generally found from the Queensland border south to Iluka at the mouth of the Clarence River, and inland as far as the Richmond Range. In NSW, White-eared Monarchs occurs in rainforest, especially drier types, such as littoral rainforest, as well as wet and dry sclerophyll forests, swamp forest and regrowth forest. They appear to prefer the ecotone between rainforest and other open vegetation types or the edges of rainforest, such as along roads. This species is known within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Mormopterus beccarii	Beccari's Freetail-bat	-	Vulnerable	-	Atlas; CMA	This species is widely distributed across northern Australia from Western Australia to Queensland, extending south to the north-east corner of NSW. The only confirmed record in NSW is of a colony found in the roof of a house in Murwillumbah, however, calls have been detected from a few other locations in the far north east of the State. They inhabit a range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. The species is known within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. It is also known within the following sub-regions of the Northern Rivers CMA: Clarence Lowlands, Clarence Sandstones and Richmond - Tweed.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Mormopterus eleryi	Hairy-nosed Freetail Bat	-	Endangered	-	CMA	This species is distributed from the southern half of the Northern Territory to central Queensland and north-western NSW. In NSW, the species has been recently recorded from only three disjunct locations including two individuals near Bonshaw. Evidence suggests that the species depends on hollows and tree fissures for roosting sites. All other Australian species from the same family generally roost in tree hollows and fissures. The species is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA.	This species is considered **likely** to occur within the study area.
Mormopterus norfolkensis	Eastern Freetail-bat	-	Vulnerable	-	Atlas; CMA	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. They occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. They are known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Myotis macropus	Large-footed Myotis	-	Vulnerable	-	Atlas; CMA	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. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. They are known within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA and known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge and Woodenbong. Predicted to occur within the , Stanthorpe Plateau sub-region.	This species is considered **likely** to occur within the study area.
Nannoperca oxleyana	Oxleyan Pygmy Perch	Endangered	-	Endangered	DII	The species is known only from south-eastern Queensland and north-eastern NSW from Woolgoolga north. Oxleyan pygmy perch occur mostly in swamps, creeks and lakes of coastal 'wallum' (Banksia-dominated coastal heath). These waters are usually acidic, with low salinity and low conductivity, and are often darkly stained. They seem to prefer slow-moving or still waters with plenty of shelter in the form of dense aquatic vegetation (e.g. sedges) or undercut, root-filled banks. It is known within the Northern Rivers CMA but records of this species are all east of Lismore.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Neochmia ruficauda ruficauda	Star Finch (eastern), Star Finch (southern)	-	-	Endangered	PMST	The distribution of the Star Finch (eastern) is very poorly known. The Star Finch (eastern) occurs only in central Queensland. Based on the small number of accepted records, the distribution of the Star Finch (eastern) is believed to extend north to Bowen, west to beyond Winton and, based on recent records, south to near Wowan. It is possible that the distribution extends further north to Mount Surprise and the Cloncurry-Mount Isa region. The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. This taxon is extinct in New South Wales.	This species is considered **unlikely** to occur within the study area.
Neophema pulchella	Turquoise Parrot	-	Vulnerable	-	Atlas; CMA	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. It lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. This species is known within the Nandewar, Northern Complex, sub-region of the Border Rivers/Gwydir CMA, and the Clarence Lowlands, Clarence Sandstones and Stanthorpe Plateau sub-regions of the Northern Rivers CMA. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Nettapus coromandelianus	Cotton Pygmy-goose	-	Endangered	-	CMA	Although once found from north Queensland to the Hunter River in NSW, the Cotton Pygmy-goose is now only a rare visitor to NSW. It occupies areas in proximity to freshwater lakes, lagoons, swamps and dams, particularly those vegetated with waterlilies and other floating and submerged aquatic vegetation. It is known within the Clarence Lowlands sub-region of the Northern RIvers CMA. Lack of records from within the study area. Nearest record is from 1971 (NSW NPWS Atlas, 2010).	This species is considered **unlikely** to be impacted by the proposed works.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Ninox connivens	Barking Owl	-	Vulnerable	-	Atlas; CMA	The Barking Owl is found throughout continental Australia except for the central arid regions. The species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. The species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Is flexible in its habitat use and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW). Known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA (respectively), and known or predicted to occur in the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Ninox strenua	Powerful Owl	-	Vulnerable	-	Atlas; CMA	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. It is known within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Norther Rivers CMA. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Notopala sublineata	River Snail	Endangered	-	-	DII	Until 2004 no live specimens of the river snail had been found in NSW for over 30 years. Although now virtually extinct throughout its natural range, some populations have been recorded as surviving in artificial habitats (irrigation pipelines) in the Murray and Darling systems. The river snail once occurred in flowing rivers throughout the Murray-Darling system, where it was found along the banks attached to logs and rocks or crawling in the mud. There are no records for this species within the Border Rivers/Gwydir or Northern Rivers CMAs.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Nurus atlas	A beetle	-	Endangered	-	CMA	This species was once widespread in heavily timbered high rainfall areas east of the Great Dividing Range on the north coast of NSW. The species had not been seen for many years and was thought to be extinct until it was rediscovered in Victoria Park near Lismore in 1973. Presently it is only known from this location and a few others in the Lismore-Alstonville area. It inhabits low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels. This species occurs within the Richmond - Tweed sub-region of the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Nurus brevis	Shorter Rainforest Ground-beetle	-	Endangered	-	CMA	This species was historically widespread in heavily timbered high rainfall areas east of the Great Dividing Range on the north coast of NSW. It was thought to be extinct until the early 1970s when populations were located in the Richmond River area. Currently the only known populations occur in very isolated patches of forest near Mallanganee, west of Casino. It inhabits low elevation rainforest, predominantly drier rainforests. It is known to occur in both the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. The only Atlas record is in Lismore, more than 10km from the Project area.	This species is considered **unlikely** to be impacted by the proposed works.
Nyctimene robinsoni	Eastern Tube-nosed Bat	-	Vulnerable	-	Atlas; CMA	Coastal areas of north-eastern Australia from Cape York south to the far north-east corner of NSW. They feed mainly on fruit and nectar from trees in the rainforest canopy and sometimes come close to human settlement to visit flowering or fruiting trees. They prefer streamside habitats within coastal subtropical rainforest and moist eucalypt forests with a well-developed rainforest understorey. This species is known to occur within the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Nyctophilus bifax	Eastern Long-eared Bat	-	Vulnerable	-	Atlas; CMA	This species is found from Cape York through eastern Queensland to the far north-east corner of NSW. In NSW they appear to be confined to the coastal plain and nearby coastal ranges, extending south to the Clarence River area. They inhabit lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. They are known to occur within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Nyctophilus timoriensis (South-eastern form)	Greater Long-eared Bat	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. The species inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. It is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. Previous records from the study area west.	This species is considered **likely** to occur within the study area.
Oedura rhombifer	Zigzag Velvet Gecko	-	Endangered	-	CMA	The Zigzag Velvet Gecko is known in NSW from three single specimens. One from Bebo State Forest, another from north of Warialda near the NSW-Queensland border, and a third individual recorded in Arakoola Nature Reserve, 50km south of Bebo. The species is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA.	This species is considered **unlikely** to occur within the study area.
Oxyura australis	Blue-billed Duck	-	Vulnerable	-	Atlas; CMA	The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is known to occur within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA. Although this species is likely to occur in the study area, they are unlikely to be impacted by the proposed works given that all potential habitat is located outside of the easement and access track footprints.	This species is considered **unlikely** to be impacted by the proposed works.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Pachycephala olivacea	Olive Whistler	-	Vulnerable	-	CMA	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. It mostly inhabits wet forests above about 500m. Known to occur within the Richmond - Tweed [(QLD - Scenic Rim) (Part A)] sub-region of the Northern Rivers CMA. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Pandion haliaetus	Osprey	-	Vulnerable	-	CMA	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. There are a handful of records from inland areas. This species favours coastal areas, especially the mouths of large rivers, lagoons and lakes. Known to occur within the Clarence Lowlands, Clarence Sandstones and Richmond - Tweed sub-regions of the Northern Rivers CMA, however previous records are restricted to more coastal areas than the study area.	This species is considered **unlikely** to occur within the study area.
Petalura gigantea	Giant Dragonfly	-	Endangered	-	CMA	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. This species lives in permanent swamps and bogs with some free water and open vegetation. It is predicted to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA and is known to occur within the Stanthorpe Plateau sub-region of the Northern Rivers CMA. This species is not likely to be impacted by the proposed works as no permanent swamps or bogs with free water will falls within the alignment or access track footprint.	This species is considered **unlikely** to be impacted by the proposed works.
Petalura litorea	Giant Dragonfly	-	Endangered	-	CMA	In NSW known populations are restricted to coastal and near coastal lowlands between Coffs Harbour and Ballina. This species inhabits permanent swamps and bogs with some free water and open vegetation. It is known to occur within the Clarence Lowlands and Clarence Sandstones sub-regions of the Northern Rivers CMA, however the proposed development is over 40km from the coastline, therefore the species would be unlikely to occur in proximity to the study area.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Petaurus australis	Yellow-bellied Glider	-	Vulnerable	-	Atlas; CMA	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. This species occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. The species is predicted to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA and known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Petaurus norfolcensis	Squirrel Glider	-	Vulnerable	-	Atlas; CMA	This species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. It inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. It is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA and known within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong. Predicted within the Rocky River Gorge sub-region. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Petrogale penicillata	Brush-tailed Rock-wallaby	-	Endangered	Vulnerable	Atlas; CMA; PMST	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. The species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. It is predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA and known oin the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong. Predicted within the Rocky River Gorge sub-region. Predicted to occur within the Clarence Lowlands.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Petroica boodang	Scarlet Robin	-	Vulnerable	-	Atlas; CMA	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin is primarily a resident in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. The species is predicted to occur within the Nandewar, Northern Complex, and known within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. It is also known within the following sub-regions fo the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Petroica phoenicea	Flame Robin	-	Vulnerable	-	Atlas; CMA	The Flame Robin is endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. It prefers clearings or areas with open understoreys. It is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is known or predicted to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Pezoporus wallicus wallicus	Eastern Ground Parrot	-	Vulnerable	-	Atlas; CMA	The eastern subspecies (wallicus) inhabits south-eastern Australia from southern Queensland through NSW to western Victoria. It formerly occurred in South Australia, but was last recorded in 1945. In NSW populations have declined and contracted to islands of coastal or subcoastal heathland and sedgeland habitats. The species is found in small numbers on the north coast (Broadwater, Bundjalung, Yuraygir NPs) and Myall Lakes on the central coast. The largest populations occur on the NSW south coast, particularly Barren Grounds NR, Budderoo NP, the Jervis Bay area and Nadgee NR. The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover). The species is known withint the Clarence Lowlands sub-region of the Northern Rivers CMA, however is restricted in distribution to within 15km of the coastline.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Phaethon rubricauda	Red-tailed Tropicbird	-	Vulnerable	-	Atlas	This species ranges throughout tropical and subtropical zones of the Indian and West Pacific Oceans, breeding on oceanic islands. Lord Howe Island is said to have the greatest breeding concentration in the world. It occupies marine habitat and breeds in coastal cliffs and under bushes in tropical Australia. It is not known or predicted to occur within any sub-region of the Northern Rivers CMA through which the study area passes.	This species is considered **unlikely** to occur within the study area.
Phascogale tapoatafa	Brush-tailed Phascogale	-	Vulnerable	-	Atlas; CMA	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west to the divide. They prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter, and also inhabit heath, swamps, rainforest and wet sclerophyll forest. It is known to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Phascolarctos cinereus	Koala	-	Vulnerable	-	Atlas; CMA	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. The species inhabits eucalypt woodlands and forests. They are known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Philoria kundagungan	Mountain Frog	-	Endangered	-	Atlas; CMA	The Mountain Frog has a restricted distribution at mid to high elevations and confined to mountains in NSW near the Queensland border in the vicinity of Tooloom National Park, Koreelah National Park, Mount Clunie National Park and Donalson State Forest. It requires continually high moisture levels and is most common in subtropical and temperate rainforests. It is known to occur in both the Richmond – Tweed and Woodenbong sub-regions of the Northern Rivers CMA at locations over 30km north of the study area.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Philoria loveridgei	Loveridge's Frog	-	Endangered	-	Atlas; CMA	This species is restricted mainly to the Nightcap and Mt Warning areas to the North of the study area, extending north-west to the Border Ranges-Lamington area on the border of NSW and Queensland. It is dependent on high moisture levels occurring in the headwaters of small streams and about soaks where ground-water is continually present and close to the surface. It favours subtropical and warm temperate rainforest and wet eucalypt forest, but also occurs in moist eucalypt forest where rocky outcropping creates surface water. It is known to occur in both the Richmond – Tweed and Woodenbong sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Philoria pughi	Philoria pughi	-	Endangered	-	Atlas; CMA	It is known in the Northern Rivers CMA and has a restricted distribution at mid to high elevations from Gibraltar Range State Forest, north-east of Glen Innes, through Gibraltar Range National Park, Washpool National Park and Forest Land State Forest to Girard State Forest west of Casino. The species requires continually high moisture levels and is most common in subtropical and temperate rainforests. It also occurs in wet eucalypt forests, where rock outcrops or cliff bases hold surface moisture.	This species is considered **likely** to occur within the study area.
Philoria richmondensis	Philoria richmondensis	-	Endangered	-	CMA	This species has a restricted distribution at mid to high elevations from the Richmond Range, Toonumbar and Yabbra areas north-west of Casino. Requires continually high moisture levels and is most common in subtropical and temperate rainforests. They are found in shallow burrows in mud, moss or leaf-litter in the headwaters and along edges of constantly flowing streams or around permanent soaks in highland forest. Also occurs in wet eucalypt forests, where rock outcrops or cliff bases hold surface moisture. This species is known to occur in the Woodenbong sub-region of the Northern Rivers CMA. Potential habitat for this species occurs between Tenterfield and Tabulum in the higher elevations around Girard State forest.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Philoria sphagnicolus	Sphagnum Frog	-	Vulnerable	-	CMA	Sphagnum Frogs are found within small sub sections of North-eastern NSW along the eastern escarpment of the Great Dividing Range from the Gibraltar Ranges to Barrington Tops. They live in rainforests, including Antarctic Beech forest, moist eucalypt forest and sphagnum moss beds, usually at higher elevations. Sphagnum Frogs burrow in loose, moist soil or moss, under leaf litter often in soaks or seepages, or may use cracks and cavities behind and beside large or small waterfalls where the environment remains saturated with moisture. They are known to occur within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. No waterfalls or natural soaks were identified within the New England Blackbutt community north of Tenterfield which may otherwise constitute habitat for this species.	This species is considered **unlikely** to occur within the study area.
Phyllodes imperialis southern subspecies	Pink Underwing Moth	-	Endangered	Endangered	CMA	The southern subspecies of the Pink Underwing Moth is distributed from Nambour, south-eastern Queensland to near Dorrigo and Bellingen, in northern NSW, but is only known from 5 or 6 locations. Population sizes in NSW appear to be small. The Pink Underwing Moth is found in subtropical rainforest below about 600 m elevation. It is predicted to occur within both the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. No subtropical rainforest will be impacted by the proposed works.	This species is considered **unlikely** to be impacted by the proposed works.
Planigale maculata	Common Planigale	-	Vulnerable	-	Atlas; CMA	This species occurs across coastal north-eastern NSW, coastal east Queensland and Arnhem Land. Common Planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. The species is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Podargus ocellatus	Marbled Frogmouth	-	Vulnerable	-	Atlas; CMA	In Australia, there are two widely separated subspecies of Marbled Frogmouth, one confined to central-eastern Cape York Peninsula, and other currently restricted to south-eastern Queensland and north-eastern NSW, between about Gladstone and Lismore, and inland to Burnett Range in Queensland and west of the Richmond Range. The species prefers subtropical rainforest, particularly in deep, wet, sheltered gullies along creeklines and often containing stands of Bangalow Palms or ferns. In NSW, it is most often found in moist, lowland, mesophyll vine forest. Less often, they are found in the ecotone between rainforest and wet Eucalyptus forests, or occasionally in cool rainforest and higher elevation temperate rainforests. This species is known to occur within unrestricted distributions within the Richmond - Tweed and Woodenbong subregions of the Northern Rivers CMA. It is known within the Clarence Lowlands sub-region as well, but is restricted to the north of the Ballina township.	This species is considered **unlikely** to occur within the study area.
Poephila cincta cincta	Black-throated Finch (southern)	-	-	Endangered	PMST	This species was once found from southern Cape York in Queensland to the Inverell district in northern NSW. It is now very rare in NSW. It inhabits Eucalypt woodland and riverside vegetation, including paperbark and wattle shrubland. This Finch species is not known or predicted to occur within any relevant sub-region of the Border Rivers/Gwydir CMA.	This species is considered **unlikely** to occur within the study area.
Polytelis swainsonii	Superb Parrot	-	Vulnerable	Vulnerable	PMST	The Superb Parrot is found throughout eastern inland NSW. This species inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. The species is not known or predicted to occur within the CMA areas through which the study area passes.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	-	Vulnerable	-	Atlas; CMA	The Grey-crowned Babbler has two distinctive subspecies. The eastern subspecies (temporalis) occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. It inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. It is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.
Potorous tridactylus	Long-nosed Potoroo	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The Long-nosed Potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. The species inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Pristis zijsron	Green Sawfish	Presumed Extinct	-	Vulnerable	DII	In Australian waters, Green Sawfish have historically been recorded in the coastal waters off Broome, Western Australia, around northern Australia and down the east coast as far as Jervis Bay, NSW. Green sawfish live on muddy or sandy-mud soft bottom habitats in inshore areas. They also enter estuaries, where they have been found in very shallow water. There are no records for this species within the Border Rivers/Gwydir or Northern Riverns CMAs.	This species is considered **unlikely** to occur within the study area.
Pseudomys delicatulus	Delicate Mouse	-	Endangered	-	CMA	The Delicate Mouse is distributed from the north-west of Western Australia, across northern Australia to the south east of Queensland. The Delicate Mouse has been found to occupy grassy habitats, and has been found within Smooth-barked Apple woodland and Broad-leaved Ironbark - Silver-leaved Ironbark woodland in NSW north of Warialda. It is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA.	This species is considered **unlikely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	-	Vulnerable	-	Atlas; CMA	In NSW the Eastern Chestnut Mouse mainly occurs north from the Hawkesbury River area as scattered records along to coast and eastern fall of the Great Dividing Range extending north into Queensland. In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. It is known within the following sub-regions of the Northern Rivers CMA: Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Pseudomys novaehollandiae	New Holland Mouse	-	_	Vulnerable	PMST	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	This species is considered **unlikely** to occur within the study area.
Pseudomys oralis	Hastings River Mouse	-	Endangered	Endangered	Atlas; CMA; PMST	This species has a patchy distribution spanning the Great Dividing Rane from the Hunter Valley, south of Mt Royal, north to the Bunya Mountains near Kingaroy in south-east Queensland, at elevations between 300 m and 1100 m. It inhabits a variety of dry open forest types with dense, low ground cover and a diverse mixture of ferns, grass, sedges and herbs. It is known to inhabit areas above 250 m altitude within the following sub-regions of the Northern Rivers CMA: Richmond - Tweed, Rocky River Gorge and Stanthorpe Plateau.	This species is considered **likely** to occur within the study area.
Pteropus alecto	Black Flying-fox	-	Not listed	-	CMA	This species is found along coastal and near-coastal areas across northern Australia through eastern Queensland to the Bellinger River in northern NSW. The inhabit remnants of coastal subtropical rainforest or swamp forest. This species is known within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area. **This speces is no longer listed under TSC Act or EPBC Act.**

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Pteropus poliocephalus	Grey-headed Flying-fox	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. The occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. This species is predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known in the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong. Predicted within the Rocky River Gorge sub-region. **This species was observed during URS surveys, however was not observed within the study area.**	This species is considered likely to occur within the study area.
Ptilinopus magnificus	Wompoo Fruit-Dove	-	Vulnerable	-	Atlas; CMA	This species occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. It is known to occur within the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Ptilinopus regina	Rose-crowned Fruit-Dove	-	Vulnerable	-	Atlas; CMA	This species occurs along the coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. The species is known to occur within the Cataract, Clarence Lowlands, Richmond - Tweed, Stanthorpe Plateau, Woodenbong sub-regions of the Northern Rivers CMA, as well as being predicted to occur within the Rocky River Gorge sub-region.	This species is considered **likely** to occur within the study area.
Ptilinopus superbus	Superb Fruit-Dove	-	Vulnerable	-	Atlas; CMA	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. This species inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Within the Northern Rivers CMA, it is known to occur within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions, and predicted to occur within the Clarence Sandstones sub-region.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Pyrrholaemus saggitatus	Speckled Warbler	-	Vulnerable	-	Atlas; CMA	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. It is known and predicted to occur in the Nandewar, Northern Complex, and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA respectively. It is also known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. This bird was observed during URS field surveys.	This species is considered **likely** to occur within the study area.
Rostratula australis	Australian Painted Snipe	-	Endangered	Vulnerable	Atlas; CMA; PMST	The Australian Painted Snipe has been recorded at wetlands in all states of Australia. It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, NSW, Victoria and south-eastern South Australia. The species generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.	This species is considered **likely** to occur within the study area.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	Vulnerable	-	Atlas; CMA	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. The species is known and predicted within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. **This species was "possibly" recorded within the study area using Anabat software.**	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Scoteanax rueppellii	Greater Broad-nosed Bat	-	Vulnerable	-	Atlas; CMA	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. This species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. It is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Sminthopsis macroura	Stripe-faced Dunnart	-	Vulnerable	-	CMA	This species occurs throughout much of inland central and northern Australia, extending into central and northern NSW, western Queensland, Northern Territory, South Australia and Western Australia. They are rare on the NSW Central West Slopes and North West Slopes. They inhabit native dry grasslands and low dry shrublands, often along drainage lines. The species is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA.	This species is considered **unlikely** to occur within the study area.
Stagonopleura guttata	Diamond Firetail	-	Vulnerable	-	Atlas; CMA	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. It is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands, and also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. It is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA and throughout relevant sub-regions of the Northern Rivers CMA; - Cataract, Clarence Lowlands, Clarence Sandstones, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. **This species was observed during URS surveys of the study area.**	This species is considered **likely** to occur within the study area. This species was observed during URS surveys of the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Sterna albifrons	Little Tern	-	Endangered	-	CMA	The Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from East Asia from September to November, occurring mainly north of Sydney. This species is almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). It is known to occur within the Clarence Lowlands sub-region of the Northern Rivers CMA however is restricted to within 10 km of the coast and tidal influenced water bodies.	This species is considered **unlikely** to occur within the study area.
Stictonetta naevosa	Freckled Duck	-	Vulnerable	-	Atlas; CMA	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. The species prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. The species is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA and known to occur within the Richmond - Tweed and Clarence Lowlands sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.
Syconycteris australis	Common Blossom-bat	-	Vulnerable	-	Atlas; CMA	This species is found within coastal areas of eastern Australia from Hawks Nest in NSW to Cape York peninsula in Queensland. It also occurs further inland to rainforest patches in adjacent ranges, roosting in littoral rainforest and feeding on nectar and pollen from flowers in adjacent heathland and paperbark swamps. This species has also been recorded in a range of subtropical forest types, rainforest, wet sclerophyll forest and coastal Eucalypt forest. This species is known in the following sub-regions of the Northern Rivers CMA: Clarence Lowlands, Clarence Sandstones and Richmond - Tweed.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Thersites mitchellae	Mitchell's Rainforest Snail	-	Endangered	Critically Endangered	CMA	This species is found on the coastal plain between the Richmond River and Tweed River on the NSW north coast. It is now only found in remnant areas of habitat and has also been recorded from some adjacent mid-elevation areas including Wilsons River and Mount Jerusalem. It occurs within remnant areas of lowland subtropical rainforest and swamp forest on alluvial soils. Slightly higher ground around the edges of wetlands with palms and fig trees is particularly favoured habitat. It is known to occur within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA. Species is restricted to coastal areas.	This species is considered **unlikely** to be impacted by the proposed works.
Thylogale stigmatica	Red-legged Pademelon	-	Vulnerable	-	Atlas; CMA	Red-legged Pademelon has a patchy distribution along coastal and subcoastal eastern Australia from Cape York to the Hunter Valley in NSW. They inhabit forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. The species is known to occur within the following sub-regions of the Northern Rivers CMA: Clarence Lowlands, Richmond - Tweed and Woodenbong.	This species is considered **likely** to occur within the study area.
Todiramphus chloris	Collared Kingfisher	-	Vulnerable	-	CMA	In Australia, the Collared Kingfisher extends around the northern coasts, from Shark Bay in northern Western Australia to the estuary of the Tweed River in far north-eastern NSW, with rare scattered records south of there, mainly south to the Clarence River. This species often perches on rock walls, jetties, piles or on the ground on tidal flats. They also sometimes occur in foreshore parks and gardens and nest in mangrove areas. They occur in the Northern Rivers CMA but are restricted to within 5 km of the coast and tidal influenced water bodies.	This species is considered **unlikely** to occur within the study area.
Turnix maculosa	Red-backed Button-quail	-	Vulnerable	-	Atlas; CMA	The Red-backed Button-quail extends discontinuously from the Kimberley region of Western Australia, through the Top End of the Northern Territory and the southern Gulf of Carpentaria, to Cape York Peninsula and eastern Queensland and central-eastern and north-eastern NSW. It is mainly a species of coastal and subcoastal regions. Over their Australian range, Red-backed Button-quail inhabit grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas, typically only in regions subject to annual summer rainfall greater than 400 mm. In NSW, they occur in grasslands, heathland and crops. They are known within the Clarence Lowlands, Clarence Sandstones and Richmond - Tweed sub-regions of the Northern Rivers CMA.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Turnix melanogaster	Black-breasted Button-quail	-	Critically Endangered	Vulnerable	CMA; PMST	The Black-breasted Button-quail is endemic to south-eastern Queensland and far north-eastern NSW, at scattered sites from the Byfield region south to the Border Ranges and mainly on and east of the Great Divide but extending inland to the inner western slopes, up to 300 km from the coast. There have been few recent records in north-eastern NSW. In NSW, as well as drier rainforests, they may occupy wetter subtropical rainforests, sometimes in association with moist eucalypt forest. They are known within the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. This species is likely to occur within the study area, however it is not likely to impacted by the proposed works as none of the associated vegetation communities will be cleared.	This species is considered **unlikely** to be impacted by the proposed works.
Tyto capensis	Grass Owl	-	Vulnerable	-	Atlas; CMA	Grass Owls have been recorded occasionally in all mainland states of Australia but are most common in northern and north-eastern Australia. In NSW they are more likely to be resident in the north-east. Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. Within the Northern Rivers CMA, this species is known to occur within the Clarence Lowlands and Richmond - Tweed subregions, and is predicted to occur within the Clarence Sandstones sub-region.	This species is considered **likely** to occur within the study area.
Tyto novaehollandiae	Masked Owl	-	Vulnerable	-	Atlas; CMA	This species extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. The Masked Owl inhabits dry eucalypt forests and woodlands from sea level to 1100 m elevation. The species is predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA and is known to occur within the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.
Tyto tenebricosa	Sooty Owl	-	Vulnerable	-	Atlas; CMA	This species occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. They inhabit rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. It is known to occupy the following Northern Rivers CMA sub-regions; Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau, and Woodenbong.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	-	Vulnerable	Vulnerable	Atlas; CMA; PMST	The Border Thick-tailed Gecko is found only on the tablelands and slopes of northern NSW and southern Queensland, reaching south to Tamworth and west to Moree. Most common in the granite country of the New England Tablelands. It often occurs on steep rocky or scree slopes and favours forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. The species is known within both the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA.	This species is considered **likely** to occur within the study area.
Vespadelus troughtoni	Eastern Cave Bat	-	Vulnerable	-	Atlas; CMA	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. It is usually found in dry open forest and woodland, near cliffs or rocky overhangs, and occasionally found along cliff-lines in wet eucalypt forest and rainforest. It is known within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA, and known in the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong. Predicted within the Rocky River Gorge and Stanthorpe Plateau sub-regions. **This species was "possibly" recorded within the study area using Anabat software.**	This species is considered likely to occur within the study area. This species was observed during URS surveys of the study area.
Xanthomyza phrygia	Regent Honeyeater	-	Endangered	Endangered	Atlas; CMA; PMST	The Regent Honeyeater occurs within the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. In NSW the distribution is very patchy and mainly confined to the two main breeding areas (Capertee Valley and the Bundarra-Barraba region) and surrounding fragmented woodlands. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. This species is known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA (respectively), as well as being known or predicted within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong.	This species is considered **likely** to occur within the study area.

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Xenus cinereus	Terek Sandpiper	-	Vulnerable	-	CMA	This species is a rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. It inhabits coastal mudflats, lagoons, creeks and estuaries, and while it favours mudbanks and sandbanks located near mangroves, it may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. This species is known and predicted to occur within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA respectively, however it's distribution is restricted to tidal influenced water bodies within 15 km of the coast.	This species is considered **unlikely** to occur within the study area.

Table 4: Threatened Populations Habitat Suitability Assessment

Scientific Name	Common Name	State Status		Common-wealth Status	Source	Distribution and Habitat Requirements	Suitability Outcome
		FM Act	TSC Act	EPBC Act			
Adelotus brevis	Tusked Frog population in the Nandewar and New England Tableland Bioregions	-	Endangered Population	-	CMA	Tusked Frogs are found along the coast and adjacent ranges from central Queensland to southern NSW. They occur within rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks ditches and ponds and call while hidden amongst vegetation or debris. Tusked frogs were once found west to the New England Tablelands and North West Slopes, now they are very rare within these regions. They remain more common in lower elevation coastal areas. A population is known to occur within the Stanthorpe Plateau sub-region of the Northern Rivers CMA.	This species is considered **likely** to occur in the study area.
Dromaius novaehollandiae	Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	-	Endangered Population	-	Atlas; CMA	The species was formerly widespread in north-eastern NSW, but that population is now isolated and largely restricted to coastal and near-coastal areas between Ballina - Evans Head and Red Rock, extending west to the Bungawalbin area. On the NSW north coast, Emus occur in a range of predominantly open lowland habitats, including grasslands, heathland, shrubland, open and shrubby woodlands, forest, and swamp and sedgeland communities, as well as the ecotones between these habitats. They also occur plantations of tea-tree and open farmland, and occasionally in littoral rainforest. They are known to occur within the Clarence Lowlands and Clarence Sandstones sub-regions of the Northern Rivers CMA.	This species is considered **unlikely** to occur within the study area.
Ambassis agassizii	Olive Perchlet	Endangered Population	-	-	DII	Olive perchlets are a small native fish that occur in both eastern (coastal) and western (Murray-Darling) drainages, but these populations may be genetically distinct. The western population of the olive perchlet was once widespread throughout the Murray-Darling system of South Australia, Victoria, western New South Wales and southern Queensland. Olive perchlets inhabit rivers, creeks, ponds and swamps. They are usually found in slow-flowing or still waters, often near overhanging vegetation or amongst logs, dead branches and boulders. Within the Border Rivers/Gwydir CMA, this species was identified within the Mole River approximately 15km to the west of Tenterfield in 2008.	This species is considered **likely** to occur within the study area.

G

Appendix G Flora Survey Results

Flora Survey Results per Community

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
Dry Sclerophyll Forest (shrubby sub-formation)	Grey Box/Narrow-leaved Ironbark/White Cypress Pine Open Forest	*Eucalyptus crebra*	Narrow-leaved Ironbark
		Callitris glaucophylla	White Cypress Pine
		Eucalyptus blakelyi.	Blakley's Red Gum
		Eucalyptus microcarpa	Grey Box
		Dodonea viscosa	
		Notelaea microcarpa var. *macrocarpa*	Native Olive
		Allocasuarina luehmannii.	Bulloak
		Austrostipa scabra subsp. Scabra,	Corkscrew Grass
		Cymbopogon refractus	
		Acacia deanei subsp. deanei	
		Beyeria viscosa	Sticky Wallaby Bush
		Cheilanthes sieberi subsp. sieberi	
		Bulbine bulbosa	
		Lomandra filiformis	
	Youman's Stringybark/Yellow Box/Blakely's Red Gum Woodland (Intergrades)	*Acacia falciformis*	Broad-leaved Hickory
		Acacia longifolia subsp. longifolia	Sydney Golden Wattle
		Allocasuarina luehmannii	Bulloak
		Amyema miquelii	
		Angophora floribunda	Rough-barked Apple
		Banksia integrifolia	Coast Banksia
		Brachychiton populneus	Kurrajong
		Briza maxima *	Quaking Grass
		Bulbine bulbosa	Native Leek
		Bulbine bulbosa	Native Leek
		Calotis cuneifolia	Purple Burr-daisy
		Cheilanthes sieberi subsp. sieberi	Poison Rock Fern
		Chrysocephalum apiculatum	Yellow Buttons
		Cirsium vulgare *	Spear Thistle
		Dendrophthoe glabrescens	
		Desmodium varians	Slender Tick-trefoil

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Dianella longifolia	Blueberry Lily
		Dichondra repens	Kidney Weed
		Dioscorea transversa	Native Yam
		Dipodium sp.	
		Entolasia marginata	Bordered Panic
		*Eragrostis curvula**	African Lovegrass
		Eucalyptus albens	White Box
		Eucalyptus amplifolia	Cabbage Gum
		Eucalyptus blakelyi	Blakely's Red Gum
		Eucalyptus melliodora	Yellow Box
		Eucalyptus youmanii	Youman's Stringybark
		Geitonoplesium cymosum	Scrambling Lily
		Geranium solanderi	Native Geranium
		Glycine tabacina	
		Hibbertia obtusifolia	Hoary Guinea Flower
		*Hypochaeris radicata **	Catsear
		Imperata cylindrica	Blady Grass
		*Juncus cognatus**	
		Kennedia rubicunda	Dusky Coral Pea
		Lomandra filiformis	Wattle Matt-rush
		Lomandra longifolia	Spiny-headed Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
		Melichrus urceolatus	Urn-heath
		Microlaena stipoides	Weeping Grass
		Oxalis perennans	
		Plectranthus graveolens	
		Poa sieberiana	Snowgrass
		Pteridium esculentumm	Common Bracken
		*Rubus fruticosus sp. agg.**	Blackberry complex
		Schoenus melanostachys	Black Bog-rush

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Solanum parvifolium	
		*Sonchus oleraceus**	Common Sowthistle
		*Stenotaphrum secundatum**	Buffalo Grass
		Themeda australis	Kangaroo Grass
		Wahlenbergia communis	Tufted Bluebell
		Xerochrysum bracteatum	Golden Everlasting
	Tumbledown Gum/Blakely's Red Gum/Pine Shrubby Open Forest	*Acacia neriifolia*	Silver Wattle
		Angophora floribunda	Rough-barked Apple
		Aristida ramosa	Purple Wiregrass
		Austrostipa setacea	Corkscrew Grass
		Callitris endlicheri	Black Cypress Pine
		Callitris glaucophylla	White Cypress Pine
		Cassinia quinquefaria	
		Chelianthes siberi	
		Cymbopogon refractus	Barbed Wire Grass
		Dianella caerulea	Blue Flax-lily
		Dichondra repens	Kidney Weed
		Einadia hastata	Berry saltbush
		Eucalyptus blakelyi	Blakely's Red Gum
		Eucalyptus caleyi	
		Eucalyptus dealbata	Tumbledown Red Gum
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Hibbertia obtusifolia	Hoary Guinea Flower
		Melichrus urceolatus	Urn-heath
		Olearia elliptica	Sticky Daisy-bush
		*Opuntia stricta**	Common Prickly Pear
		Persoonia sericea	
		Poa siberiana	
		Wahlenbergia stricta	Australian Bluebell
		Xanthorrhoea acaulis	
		Xanthorrhoea glauca	

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
	Tumbledown Gum/Blakely's Red Gum/Pine Shrubby Open Forest (Disturbed Regrowth)	*Acacia neriifolia*	Silver Wattle
		Aristida ramosa	Purple Wiregrass
		Bothriochloa macra	Red Grass
		Callitris sp.	
		Cassinia quinquefaria	
		Cheilanthes sieberi	
		Dianella caerulea	Blue Flax-lily
		Discaria pubescens	Hairy anchor plant
		Dodonaea viscosa	Sticky Hop-bush
		Entolasia stricta	Wiry Panic
		Erodium crinitum	Blue Storksbill
		Eucalyptus dealbata	Tumbledown Red Gum
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Geranium solanderi	Native Geranium
		Hyparrhenia hirta	Coolatai Grass
		Leucopogon muticus	Blunt Beard-heath
		*Opuntia stricta**	Common Prickly Pear
		*Senecio madagascariensis**	Fireweed
		Sorghum leiocladum	Wild Sorghum
		Wahlenbergia stricta	Australian Bluebell
		Xanthorrhoea johnsonii	Johnson's Grass Tree
		Xanthorrhoea latifolia	
Forested Wetland	River Oak Riparian Woodland	*Casuarina cunninghamiana*	River Oak
		Angophora floribunda	Rough-barked Apple
		Eucalyptus blakelyi	
		Melaleuca bracteata	
		Bursaria spinosa subsp. spinosa	Blackthorn
		Callistemon viminalis	Weeping Bottlebrush
		Leptospermum brevipes	
		Notelaea microcarpa var. *microcarpa*	

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Microlaena stipoides var. *stipoides*	Weeping Rice Grass
		Oplismenus imbecillis	Basket Grass
		Lomandra longifolia	Matt rush
		Urtica incise	
		Cymbopogon refractus	
		Austrostipa verticillata	
		Elymus scaber	Common Wheat Grass
		Dicondra repens	Kidney Grass
		Carex appressa	
		Urtica spp.*	Stinging Nettle
		Cirsium spp.*	Thistle
	River Red Gum Riverine Woodland	*Aristida ramosa*	Purple Wiregrass
		Austrostipa bigeniculata	
		Austrostipa ramosissima	Stout Bamboo Grass
		Austrostipa scabra	Speargrass
		Bothriochloa macra	Red-leg Grass
		Callistemon citrinus	Crimson bottlebrush
		Callistemon citrinus	Crimson bottlebrush
		Casuarina cunninghamiana	River Oak
		Commelina cyanea	Native Wandering Jew
		Cymbopogon refractus	Barbed Wire Grass
		Cynodon dactylon	Couch
		Cyperus fulvus	Sticky Sedge
		Cyperus gunnii subsp. gunnii	
		Cyperus lhotskyanus	
		Cyperus lucidus	Leafy Flat Sedge
		Dichondra repens	Kidney Weed
		Eucalyptus camaldulensis	River Red Gum
		Geranium solanderi	Native Geranium
		Leucopogon muticus	Blunt Beard-heath

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Lomandra longifolia	Spiny-headed Mat-rush
		Microlaena stipoides	Weeping Grass
		Oxalis perennans	
		Persicaria decipiens	Slender Knotweed
		Poa labillardierei var. labillardierei	Tussock
		Rumex brownii	Swamp Dock
		Urtica incisa	Stinging Nettle
	River Red Gum Riverine Woodlands (Disturbed)	*Acacia neriifolia*	Silver Wattle
		*Acetosella vulgaris**	Sheep Sorrel
		*Ailanthus altissima**	Tree of Heaven
		*Anagallis arvensis**	Scarlet Pimpernel
		Angophora floribunda	Rough-barked Apple
		*Anthoxanthum odoratum**	Sweet Vernal Grass
		Aristida jerichoensis	Jericho Wiregrass
		*Bidens pilosa**	Cobblers Peg
		*Brassica napus **	Rape
		*Bromus catharticus**	Prairie Grass
		Callitris glaucophylla	White Cypress Pine
		*Capsella bursa-pastoris**	Shepherd's Purse
		Casuarina cunninghamiana	River Oak
		*Cestrum parqui **	Green Cestrum
		*Cirsium vulgare **	Spear Thistle
		*Citrus x taitensis**	Rough Lemon
		*Conyza bonariensis**	Flaxleaf Fleabane
		*Cyclospermum leptophyllum **	Slender Celery
		*Cynara cardunculus **	Cardoon
		*Cyperus brevifolius **	
		*Cyperus eragrostis**	
		Daucus glochidiatus	Native Carrot
		Dichondra repens	Kidney Weed
		*Digitaria ciliaris **	Summer Grass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		*Echium plantagineum**	Paterson's Curse
		Einadia hastata	Berry Saltbush
		*Eragrostis curvula **	African Lovegrass
		Eucalyptus camaldulensis	River Red Gum
		*Euphorbia peplus **	Petty Spurge
		Gomphocarpus physocarpus	Balloon Cotton Bush
		*Holcus lanatus**	Yorkshire Fog
		*Hypochaeris radicata **	Catsear
		*Juncus cognatus **	Jerusalem Cherry
		*Lagurus ovatus**	Hare's Tail Grass
		*Macfadyena unguis-cati **	Cat's Claw Creeper
		*Opuntia aurantiaca**	Tiger Pear
		*Opuntia stricta**	Common Prickly Pear
		*Oxalis sp.**	
		*Paspalum dilatatum**	Paspalum
		*Passiflora subpeltata**	White Passionflower
		*Sanguisorba minor**	Salad Burnet
		*Sanguisorba minor**	Salad Burnet
		*Setaria pumila**	Pale Pigeon Grass
		*Sida rhombifolia**	Paddy's Lucerne
		*Solanum lycopersicum **	Tomato
		*Solanum nigrum**	Black-berry Nightshade
		*Sonchus oleraceus**	Common Sowthistle
		*Sporobolus africanus **	Parramatta Grass
		*Stenotaphrum secundatum**	Buffalo Grass
		*Taraxacum officinale**	Dandelion
		*Trifolium repens**	White Clover
		*Urtica incisa **	Stinging Nettle
		*Verbena bonariensis**	Purpletop
		*Verbena officinalis**	Common Verbena

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
	Swamp Box/Swamp Mahogony Swamp Forest (Intergrades)	*Baumea muelleri*	
		Casuarina cuninghamiana	River She-oak
		Casuarina glauca	Swamp She-oak
		Chloris truncata	Windmill Grass
		Corymbia intermedia	Pink Bloodwood
		*Conyza sp.**	Fleabane*
		Cynodon dactylon	Couch, Bermudagrass
		*Cyperus brevifolius**	
		Eucalyptus tereticornis	Forest Red Gum
		Eucalyptus siderophloia,	Grey Ironbark
		Juncus usitatus	
		Juncus australis	
		*Lantana camara**	Lantana*
		*Oxalis sp**	
		Oxalis perennans	
		Melaleuca quinquenervia	Broad-leafed paperbark
		Melaleuca decora	
		Parsonsia straminea	Monkey Rope
		Senecio madagascariensis	Fireweed
		Setaria viridis	Green Pigeon Grass
		Sonchus oleraceus	Common Sowthistle
		Themeda australis	Kangaroo Grass
		Typha orientalis	Broadleaf Cumbungi
	Swamp Box Swamp Forest (Disturbed)	*Acacia ulicifolia*	Prickly Moses
		Backhousia myrtifolia	Grey Myrtle
		Casuarina glauca	Swamp Oak
		Casuarina cunninghamiana	River Oak
		Glycine clandestina	
		*Hypochaeris radicata**	Catsear*
		Imperata cylindrica	Blady Grass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Lophostemon suaveolens	Swamp Box
		Melaleuca alternifolia	Tea tree
		Melaleuca bracteata	Black Tea-tree
		Microlaena stipoides	Weeping Grass
		Oxalis perennans	
		Plantago lanceolata *	Lambs Tongues*
		*Sida rhombifolia**	Paddy's Lucerne*
		Tristaniopsis laurina	Water Gum
		Verbena quadrangularis *	
	Water Gum / Forest Red Gum Riparian Woodland	*Tristaniopsis laurina*	Water Gum
		Eucalyptus tereticornis	*Forest Red Gum*
		Lomandra longifolia	Matt Rush
Grassy Woodland	Blakely's Red Gum/White Box Grassy Woodland	*Acacia ulicifolia*	Prickly Moses
		Angophora subvelutina	Broad-leaved Apple
		Cheilanthes sieberi	
		Desmodium varians	Slender Tick-treefoil
		Dichondra repens	Kidney Weed
		Eucalyptus amplifolia	Cabbage Gum
		Eucalyptus blakelyi	Blakely's Red Gum
		Eucalyptus eugenioides	Thin-leaved Stringybark
		Glycine clandestina	
		Hydrocotyle peduncularis	
		Microlaena stipoides	Weeping Grass
		Pratia purpurascens	Whiteroot
		Themeda australis	Kangaroo Grass
		Wahlenbergia stricta	Tall Bluebell
	Inland Grey Box Tall Grassy Woodland (Disturbed)	*Acacia implexa*	Hickory Wattle
		Acacia leucoclada	
		Angophora floribunda	Rough Barked Apple
		Austrostipa ramosissima	Stout Bamboo Grass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Austrostipa setacea	Corkscrew Grass
		Bidens pilosa	Cobbler's Peg
		Cassinia quinquefaria	
		Cymbopogon refractus	Barbed Wire Grass
		Dactylis glomerata	Cocksfoot
		Desmodium varians	Slender Tick-trefoil
		Dianella longifolia	Blueberry Lily
		Dichondra repens	Kidney Weed
		Einadia trigonos	Fishweed
		Eucalyptus microcarpa	Grey Box
		Imperata cylindrica	Blady Grass
		Indigofera australis	Australian Indigo
		Lomandra longifolia	Spiny-headed Mat-rush
		Maireana microphylla	Small leaved Blue Bush
		Marrubium vulgare	White Horehound
		Plantago lenceolata	Lamb's tongue
		Plantago sp.	
		Rubus parvifolius	Native Rasberry
		Senecio quadridentatus	Cotton Fireweed
		Solanum capsicoides	Devil's Apple
		Ammobium alatum	
		*Anagallis arvensis**	Scarlet Pimpernell
		Andropogon virginicus *	Whiksy Grass
		Austrostipa scabra	Speargrass
		Austrostipa setacea	Corkscrew Grass
		*Bidens pilosa**	Cobblers Pegs
		Calocephalus sp.	
		Cassinia trinerva	
		Chloris truncata	Windmill Grass
		Conyza bonariensis *	Flaxleaf Fleabane

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		*Dactylis glomerata**	Cocksfoot
		Dendrophthoe vitellina	
		Dichondra repens	Kidney Weed
		Discaria pubescens	Hairy Anchor Plant
		Dodonaea viscosa	Sticky Hop-Bush
		*Eragrostis curvula**	African Lovegrass
		Erodium crinitum	Blue Storksbill
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus melliodora	Yellow Box
		Eucalyptus microcarpa	Grey Box
		Eucalyptus moluccana	Grey Box
		Leucopogon muticus	Blunt Beard-heath
		*Lolium perenne**	Perennial Ryegrass
		Maireana sp.	
		Notelaea microcarpa	Native Olive
		*Opuntia stricta**	Common Prickly Pear
		*Oxalis pes-caprae**	
		*Solanum capsicoides**	Devil's Apple
		Wahlenbergai communis	Tufted Bluebell
		Wahlenbergia stricta	Australian Bluebell
	Cabbage Gum Grassy Woodland	*Axonopus fissifolius**	Carpet grass
		*Bromus catharticus**	Prairie Grass
		Cyperus gracilis	Slender Flat-sedge
		*Dactylis glomerata**	Cocksfoot
		Desmodium varians	Slender Tick-trefoil
		*Eragrostis curvula**	African Lovegrass
		Eragrostis leptostachya	Paddock Lovegrass
		Eragrostis parviflora	Weeping Lovegrass
		Eucalyptus amplifolia	Cabbage Gum
		Eucalyptus blakelyi	Blakely's Red Gum

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Glycine clandestina	
		Juncus filicaulis	
		Microlaena stipoides	Weeping Grass
		*Sonchus oleraceus**	Common Sowthistle
		*Sporobolus africanus**	Parramatta Grass
		*Trifolium arvense**	Haresfoot Clover
	Rough-barked Apple riparian forb/grass Open Forest	*Acacia melanoxylon*	Black Wattle
		Allocasuarina torulosa	Forest Oak
		Angophora floribunda	Rough-barked Apple
		*Bidens pilosa**	Cobber's Peg*
		Cassinia uncata	Sticky Cassinia
		Centella asiatica	Indian Pennywort
		Cheilanthes sieberi subsp. sieberi	Mulga Fern
		Cymbogon refractus	Barbed Wire Grass
		Dicondra repens	Kidney weed
		Eucalyptus macrorhyncha	Red Stringybark
		Eustrephus latifolius	Wombat Berry
		Eucalyptus bridgesiana	Apple Box
		Geranium solanderi	Native Geranium
		Hardenbergia violacea	Purple Coral Pea
		Hydrocotyle peduncularis	
		Jacksonia scoparia	Dogwood
		*Ligustrum lucidum**	Large-leaved Privet*
		Lomandra multiflora	Many-flowered Mat-rush
		Microlaena stipiodes	Weeping Grass
		Pittosporum undulatum	Sweet Pittosporum
		Physalis peruviana	Cape Gooseberry
		*Plantago sp.**	Plantain*
		Poa labrilliana	River Tussock
		Poa siberiana	Snowgrass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		*Rubus sp.**	Blackberry*
		*Sida rhombifolia**	Paddy's Lucern*
		Stephania japonica	Snake Vine
		Swainsona queenslandica	Smooth Darling Pea
		Themeda australis	Kangaroo Grass
		*Trifolium repens**	White Clover*
		*Verbascum thapsus**	Great Mullien*
		*Verbena quadrangularis**	Purpletop*
		Imperata cylindrica	Blady Grass
		*Lantana camara**	Lantana
		Lomandra filiformis	Wattle Mat-rush
		Lomandra longifolia	Spiny-headed Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
		Melichrus urceolatus	Urn-heath
		*Opuntia aurantiaca**	Tiger Pear
		*Opuntia stricta**	Common Prickly Pear
		Oxalis perennans	
		Poa sieberiana	Snowgrass
		*Rubus fruticosus sp. agg.**	Blackberry complex
		Rumex brownii	Swamp Dock
		*Sonchus oleraceus**	Common Sowthistle
		Styphelia triflora	Pink Fiver-corners
		Themeda australis	Kangaroo Grass
		*Verbena bonariensis**	Purpletop
		Wahlenbergia gracilis	Sprawling Bluebell
		Xanthorrhoea acaulis	
		Xerochrysum bracteatum	Golden Everlasting
	Blakely's Red Gum/Grey Box/Rough Barked Apple Grassy Woodland (derivatives)	*Ammobium alatum*	
		Austrostipa scabra	Speargrass
		Austrostipa setacea	Corkscrew Grass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Calocephalus sp.	
		Cassinia trinerva	
		Chloris truncata	Windmill Grass
		Dendrophthoe vitellina	
		Dichondra repens	Kidney Weed
		Dichondra repens	Kidney Weed
		Discaria pubescens	Hairy Anchor Plant
		Dodonaea viscosa	Sticky Hop-Bush
		Erodium crinitum	Blue Storksbill
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus melliodora	Yellow Box
		Eucalyptus microcarpa	Grey Box
		Eucalyptus moluccana	Grey Box
		Leucopogon muticus	Blunt Beard-heath
		Leucopogon muticus	Blunt Beard-heath
		Maireana sp.	
		Notelaea microcarpa	Native Olive
		Wahlenbergai communis	Tufted Bluebell
		Wahlenbergia stricta	Australian Bluebell
	Forest Red Gum/ Swamp Box Open Forest	*Carex appressa*	Tall Sedge
		Cirsium vulgare	Spear Thistle
		Casuarina cunninghamiana	River Oak
		*Digitaria ciliaris**	Summer Grass*
		Eucalyptus moluccana	Coastal Grey Box
		Eucalyptus tereticornis	Forest Red Gum
		Gahnia aspera	Rough Saw-sedge
		Gomphocarpus physocarpus	Ballon Cotton Bush
		Imperata cylindrica	Blady Grass
		Juncus usitatus	
		*Senecio madagascariensis**	Fireweed*

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
	Forest Red Gum/ Swamp Box Forest (Disturbed)	*Austrostipa densiflora*	
		*Conyza sp.**	Fleanbane*
		Eucalyptus tereticornis	Forest Red Gum
		Ficus sp.	Fig
		Gahnia aspera	Rough Saw-sedge
		Grevillea robusta	Silky Oak
		Imperata cylindrica	Blady Grass
		*Lantana camara**	Lantana*
		Lophostemon confertus	Brush Box
		Lophostemon suaveolens	Swamp Box
		*Pennisetum clandestinum**	Kikuyu Grass*
		Oplismenus aemulus	
		Parsonsia straminea	Monkey Rope
		Pteridium esculentum	Bracken
		Senecio hispidulus	Hill Fireweed
		Smilax australis	Barbed Wire Vine
		*Sporobolus pyramidalis**	Giant Rats-tail Grass*
		*Urtica urens**	Small Nettle*
		*Vicia sativa**	Vetch*
	White Box Grassy Woodland	*Acacia sp. (not flowering)*	
		Amyema miquelii	
		Angophora floribunda	Rough-barked Apple
		Austrodanthonia racemosa var. racemosa	
		Austrostipa bigeniculata	
		Austrostipa ramosissima	Stout Bamboo Grass
		Austrostipa scabra	Speargrass
		Bothriochloa macra	Red-leg Grass
		Bursaria spinosa	Blackthorn
		Cymbidium canaliculatum	Tiger Orchid

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Dendrophthoe glabrescens	
		Dianella longifolia	Blueberry Lily
		Dichondra repens	Kidney Weed
		Eucalyptus albens	White Box
		Eucalyptus blakelyi	Blakely's Red Gum
		Hypochaeris radicata	Catsear
		Imperata cylindrica	Blady Grass
		Lomandra filiformis	Wattle Mat-rush
		Lomandra longifolia	Spiny-headed Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
		Melichrus urceolatus	Urn-heath
		Opuntia aurantiaca	Tiger Pear
		Opuntia stricta	Common Prickly Pear
		Oxalis perennans	
		Poa sieberiana	Snowgrass
		Rubus fruticosus sp. agg.	Blackberry complex
		Rumex brownii	Swamp Dock
		Sporobolus africanus	Parramatta Grass
		Themeda australis	Kangaroo Grass
		Verbena bonariensis	Purpletop
		Wahlenbergia gracilis	Sprawling Bluebell
		Xanthorrhoea acaulis	
		Xerochrysum bracteatum	Golden Everlasting
	White Box Grassy Woodland (Disturbed)	*Acacia neriifolia*	Silver Wattle
		Angophora floribunda	Rough-barked Apple
		Austrostipa ramosissima	Stout Bamboo Grass
		Austrostipa sp.	A speargrass
		Callitris endlicheri	Black Cypress Pine
		Callitris glaucophylla	White Cypress Pine
		Dichondra repens	Kidney Weed

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Eucalyptus albens	White Box
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus microcarpa	Inland Grey Box
		Kunzea ericoides	Burgan
		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
		*Opuntia aurantiaca**	Tiger Pear
		*Opuntia stricta**	Common Prickly Pear
		Oxalis perennans	
		Pimelea neo-anglica	Poison Pimelea
		*Sida rhombifolia**	Paddy's Lucerne
	Fuzzy Box/Grey Box Grassy Woodland (Disturbed)	*Eucalyptus conica*	Fuzzy Box
		Eucalyptus microcarpa	Grey Box
		*Onoporodum acanthium**	Scotch thistle
		*Andropogon virginicus**	Whiskey Grass
		*Eragrostis curvula**	African Love Grass
		Conzya spp.*	Fleabane
Semi-Arid Woodland	Dirty Gum Tall Woodland	*Eucalyptus chloroclada*	Dirty Gum
		Callitris glaucophylla	White Cypress Pine
		Alstonia constricta	Quinine Bush
		Alectryon oleifolius subsp. canescens	Western Rosewood
		Acacia inophylla	
		Acacia salicina	Coobah
		Hakea leucoptera subsp. leucoptera	Needlewood
		Allocasuarina luehmannii	Bulloak
		Austrostipa scabra subsp. scabra	Corkscrew Grass
		Aristida jerichoensis var. jerichoensis	
		Einadia nutans subsp. nutans	
		Sclerolaena bicornis	
		Cymbopogon refractus	

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Enteropogon acicularis	Curly Windmill Grass
		Paspalidium constrictum	
		Hyparrhenia hirta	
	Silver-leaved Ironbark / White Cypress Pine Woodland	*Acacia neriifolia*	Silver Wattle
		*Ailanthus altissima**	Tree of Heaven
		Amyema miquelii	
		Angophora floribunda	Rough-barked Apple
		Aristida ramosa	Purple Wiregrass
		Austrodanthonia racemosa var. racemosa	
		Austrostipa bigeniculata	
		Austrostipa ramosissima	Stout Bamboo Grass
		Austrostipa scabra	Speargrass
		Austrostipa setacea	Corkscrew Grass
		*Bidens Pilosa**	Cobblers Peg
		Brachychiton populneus	Kurrajong
		Breynia oblongifolia	Coffee Bush
		Callitris glaucophylla	White Cypress Pine
		Calotis cuneifolia	Purple Burr-daisy
		*Carthamus lanatus**	Saffron Thistle
		Cassinia uncata	Sticky Cassinia
		Cheilanthes austrotenuifolia	Rock Fern
		Cheilanthes distans	Bristly cloak fern
		Cheilanthes sieberi subsp. sieberi	Poison Rock Fern
		*Cirsium vulgare**	Spear Thistle
		Corymbia intermedia	Pink Bloodwood
		Cymbidium canaliculatum	Tiger Orchid
		Cymbopogon refractus	Barbed Wire Grass
		Dendrophthoe glabrescens	
		Dichondra repens	Kidney Weed

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Dioscorea transversa	Native Yam
		Dodonaea viscosa	Sticky Hop-bush
		Eucalyptus albens	White Box
		Eucalyptus crebra	Narrow-leaved Ironbark
		Eucalyptus dealbata	Tumbledown Red Gum
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus melliodora	Yellow box
		Eucalyptus sideroxylon	Mugga Ironbark
		Exocarpos cupressiformis	Native Cherry
		Glycine tabacina	
		*Gomphocarpus fruticosus**	Narrow-leaved Cotton Bush
		Goodenia hederacea	Forest Goodenia
		Hibbertia obtusifolia	Hoary guinea flower
		*Lagurus ovatus**	Hare's Tail Grass
		Leucopogon muticus	Blunt Beard-heath
		Lomandra confertifolia subsp. pallida	
		Lomandra filiformis	Wattle Matt-rush
		Lomandra laxa	
		Lomandra longifolia	Spiny-headed Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
		Melichrus urceolatus	Urn-heath
		Notelaea microcarpa	Native Olive
		Olearia elliptica	Sticky Daisy-bush
		*Opuntia aurantiaca**	Tiger Pear
		*Opuntia stricta**	Common Prickly Pear
		Oxalis perennans	
		Pandorea pandorana	Wonga Wonga Vine
		Pimelea neo-anglica	Poison Pimelea
		Plectranthus suaveolens	
		Poa labillardierei	Tussock Grass
		Poa sieberiana	Snowgrass
		*Sonchus oleraceus**	Common Sowthistle

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Swainsona galegifolia	Smooth Darling Pea
		*Taraxacum officinale**	Dandelion
		Urtica incisa	Stinging Nettle
		*Verbena bonariensis**	Purpletop
		*Xanthium spinosum**	Bathurst Burr
		Xanthorrhoea acaulis	
		Xerochrysum bracteatum	Golden Everlasting
Wet Sclerophyll Forest (shrubby formation)	Messmate/Brown Barrel Grassy Open Forest	*Eucalyptus obliqua*	Messmate
		Eucalyptus fastigata	Brown Barrel
		Eucalyptus nobilis	Mountain Ribbon Gum
		Lophostemon confertus	Brush Box
		Acacia melanoxylon	Blackwood
		Banksia oblongifolia	
		Banksia serrata	Old Man Banksia
		Leucopogon lanceolatus	
		Rubus parvifolius	
		Dichondra repens	*Kidney Weed*
		Glycine clandestina	
		Viola hederacea	
		Coprosma quadrifida	
		Pteridium esculentum	Bracken
		Poa sieberiana var. sieberiana	*Snowgrass*
		Lomandra longifolia	Matt rush
		Smilax australis	
		*Andropogon virginicus**	Whiskey Grass
	Spotted Gum/Brush Box Moist Forest	*Corymbia variegata*	
		Trochocarpa laurina	
		Cissus antarctica	Water Vine
		Imperata cylindrica var. *major*	Blady Grass
		Doodia aspera	
		Glycine clandestina	Twining Glycine
		Cissus hypoglauca	Five leaf Water Vine

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Breynia oblongifolia	
		Rubus parvifolius	
		Psychotria loniceroides	
		Lophostemon confertus	Brush Box
		Allocasuarina torulosa	Forest Oak
		Hardenbergia violacea	False Sarsaparilla
		Gymnostachys anceps	
		Lomandra longifolia	Matt Rush
		Eustrephus latifolius	
		Dianella caerulea	Flax Lily
		Pratia purpurascens	
	Sydney Blue Gum Open Forest	*Eucalyptus saligna*	Sydney Blue Gum
		Lophostemon confertus	Brush Box
		Eucalyptus microcorys	Tallowood
		Angophora subvelutina	Broad-leaved Apple
		Acacia irrorata	Green Wattle
		Acacia maidenii	Maidens Wattle
		Trochocarpa laurina	
		Imperata cylindrica var. *major*	Blady Grass
		Lepidosperma laterale	
		Poa labillardierei	Tussock Grass
		Themeda australis	Kangaroo Grass
		Doodia aspera	
		Desmodium varians	
		Lomandra longifolia	Matt Rush
		Oplimenus aemulus	Basket Grass
		Dianella caerulea	Flax Lily
		Sorghum leiocladum	

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
Dry Sclerophyll Forest (Shrub/grass sub formation)	Dirty Gum/White Cypress Pine/Silver-leaved Ironbark Open Forest (Integrades)	*Eucalyptus chloroclada*	Dirty Gum
		Callitris glaucophylla	White Cypress Pine
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus crebra	Narrow-leaved ironbark
		Notelaea microcarpa	
		Acacia falcata	Hickory Wattle
		Aristida vagans	
		Imperata cylindrica	Blady Grass
		Cheilanthes distans	
		Cheilanthes sieberi subsp. sieberi	
		Eragrostis brownii	
		Leptospermum brevipes	Slender tea tree
	Flood Gum/Grey Ironbark Tall Open Forest (Disturbed) / Forest Red Gum Grassy Open Forest	*Eucalyptus tereticornis*	
		Angophora subvelutina	Broad-leaved Apple
		Angophora floribunda	
		Corymbia intermedia	Pink Bloodwood
		Eucalyptus crebra	Narrow-leaved ironbark
		Leptospermum polygalifolium	
		Leptospermum trinervium	
		Xanthorrhoea johnsonii	Grass Tree
		Allocasuarina torulosa	Forest Oak
		Acacia linifolia	
		Acacia terminalis	
		Acacia implexa	
		Cymbopogon refractus	
		Themeda australis	Kangaroo Grass
		Austrostipa sp.	
		Dichondra repens	
		Imperata cylindrica	Blady Grass
		*Lantana camara**	Lantana

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Rubus sp.*	Blackberry
		*Andropogon virginicus**	Whisky Grass
		Oxalis spp.*	
		*Eragrostis curvula**	African Love Grass
	Forest Red Gum/ Broad-leaved Apple Dry Open Forest	*Angophora subvelutina*	Broad-leaved Apple
		Acacia parvipinnula	
		Eragrostis curvula	African Love Grass
		Eucalyptus resinifera	Red Mahogony
		Eucalyptus tereticornis	Forest Red Gum
		*Gomphocarpus physocarpus**	Balloon Cotton Bush*
		Imperata cylindrica	Blady Grass
		*Lantana camara**	Lantana
		Melichrus urceolatus	Urn heath
		*Senecio madagascariensis**	Fireweed*
		Themeda australis	Kangaroo Grass
	Forest Red Gum/ Pink Bloodwood Open Forest	*Allocasuarina torulosa*	Forest She-oak
		*Andropogon virginicus**	Whisky Grass*
		Angorphora floribunda	Rough-barked Apple
		Austrostipa setacea	Corkscrew Grass
		Cymbopogon refractus	Barbed Wire Grass
		Corymbia intermedia	Pink Bloodwood
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus tereticornis	Forest Red Gum
		Hakea dactyloides	Finger hakea
		Kunzea bracteolata	
		Leptospermum trinervium	Slender Tea-tree
		Leptospermum polygalifolium	Tantoon
		Lomandra longifolia	Spiny-headed Mat Rush
		Lomandra multiflora	Many-flowered Mat-rush
		Poa siberana	Snowgrass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Pteridium esculentum	Bracken
		*Rubus sp**	Blackberry*
		Xanthorrhoea johnsonii	Grass Tree
		Xanthorrhoea latifolia	Grass Tree
	Grey Gum/ Grey Ironbark Open Forest	*Acacia linifolia*	White Wattle
		Allocasuarina torulosa	Forest She-oak
		Bidens pilosa	Cobblers Peg
		Calocephalus citreus	Lemon-beauty-head
		Clematis glycinoides	Headache Vine
		*Conyza sp.**	Fleabane*
		Corymbia intermedia	Pink Bloodwood
		Dianella longifolia	Blueberry Lily
		Dicondra repens	Kidney Weed
		Eucalyptus acmenoides	White Mahogany
		Eucalyptus caliginosa	Broad-leaved Stringybark
		Eucalyptus propinqua	Small-fruited Grey Gum
		Eucalyptus siderophloia	Grey Ironbark
		Eucalyptus tereticornis	Forest Red Gum
		Eustrephus latifolia	Wombat Berry
		*Gomphocarpus physocarpus **	Balloon Cotton Bush*
		Geitonoplesium cymosum	Scrambling lily
		Geranium solanderi	Native Geranium
		Glycine cladenstine	
		*Gomphocarpus physocarpus**	Balloon Cotton Bush*
		Hydrocotyle peduncularis	
		Imperata cylindrica	Blady Grass
		Kennedia prostrata	Running Postman
		Leucopogon lanceolatus	
		Poa siberiana	Snowgrass
		Pteridium esculentum	Bracken

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		*Sonchus oleraceus**	Common Sowthistle*
		Themeda australis	Kangaroo Grass
	Grey Ironbark/Grey Gum/New England Blackbutt Open Forest (Intergrades)	*Eucalyptus siderophloia*	Grey Ironbark
		Eucalyptus propinqua	Small-fruited Grey Gum
		Eucalyptus tereticornis	Forest Red Gum
		Eucalyptus caliginosa	
		Corymbia intermedia	Pink Bloodwood
		Acacia implexa	Lightwood
		Acacia terminalis	Sunshine Wattle
		Acacia longifolia	
		Acacia linifolia	White Wattle
		Indigofera australis	
		Melichrus urceolatus	
		Leucopogon lanceolata	
		Allocasuarina torulosa	Forest Oak
		Dianella caerulea	Flax Lily
		Austrostipa sp.	
		Cymbopogon refractus	
		Themeda australis	Kangaroo Grass
		Imperata cylindrica	Blady Grass
		Dichondra repens	Kidney Weed
		Gomphocarpus spp.*	Cotton bush
		Conyza sp.*	Fleabane
		*Lantana camara**	Lantana
	Narrow-leaved Ironbark Dry Open Forest / Ironbark Wattle Woodland (Disturbed)	*Austrostipa setacea*	Corkscrew Grass
		Acacia brownii	Hedge Hog Wattle
		Acacia binervia	Coastal Myall
		Acacia terminalis	Sunshine Wattle
		Allocasuarina torulosa	Forest Oak
		Breynia oblongifolia	Coffee Bush

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Cheilanthes sieberi	Mulga fern
		Chrysocephalum apiculatum	Common Everlasting
		Chrysocephalum semipapposum	Clustering Everlasting
		Chloris truncata	Windmill grass
		Clematis glycinoides	Headache Vine
		Corymbia gummifera	Red Bloodwood
		Corymbia intermedia	Pink Bloodwood
		Corymbia henryi	Large-spotted Gum
		Corymbia maculata	Spotted Gum
		Dicondra repens	Kidney Weed
		*Eragrostis curvula**	African Love Grass*
		Entolasia stricta	Wiry Panic
		Eucalyptus crebra	Narrow-leaved Ironbark
		Eucalyptus melanophloia	Silver-leaved Ironbark
		Eucalyptus macrorhyncha	Red Stringybark
		Eucalyptus tereticornis	Forest Red Gum
		Glycine tabacina	
		Imperata cylindrica	Blady Grass
		Kennedia rubicunda	Dusky Coral Pea
		Jacksonia scoparia	Dogwood
		Lomandra filiformis	Wattle Mat-rush
		Lomandra longifolia	Spiny-headed Mat Rush
		*Lantana camara**	Lantana*
		Persoonia oleoides	
		Poa siberiana	Snowgrass
		Themeda australis	Kangaroo Grass
		Xanthorrhoea latifolia	
	New England Strinybark/Peppermint/ Grey Ironbark/ Grey Gum Open Forest (Intergrades)	*Allocasuarina torulosa*	Forest Oak
		*Andropogon virginicus**	Whisky Grass*
		Billardiera scandens	Hairy Apple Berry

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Bidens pilosa	Cobblers Peg
		Calotis cuneifolia	Purple Burr Daisy
		Cheilanthes sieberi subsp. sieberi	Mulga fern
		*Cirsium vulgare**	Spear Thistle*
		*Conyza sp.**	Fleabane*
		Dianella caerulea	Blue Flax Lily
		Dianella revoluta	Blueberry Lily
		Dicondra repens	Kidney Weed
		Entolasia marginata	Border Panic
		Entolasia stricta	Narrow Panic
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus acmenoides	White Mahogany
		Eucalyptus caliginosa	Broad-leaved Stringybark
		Eucalyptus campanulata	New England Blackbutt
		Eucalyptus propinqua	Small-fruited Grey Gum
		Eucalyptus radiata	Narrow-leaved Peppermint
		Eustrephus latifolia	Wombat Berry
		Eucalyptus siderophloia	Grey Ironbark
		Geitonoplesium cymosum	Scrambling lily
		Glycine clandestina	
		Goodenia hederacea	Ivy Goodenia
		Hardenbergia violacea	Native Violet
		Hydrocotyle peduncularis	
		Imperata cylindrica	Blady Grass
		Kennedia prostrata	Running Postman
		Leucopogon lanceolatus	
		Lomandra multiflora	Many-flowered Mat-rush
		Pittosporum undulatum	Sweet Pittosporum
		Pratia purpurascens	Whiteroot
		Pteridium esculentum	Bracken

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		*Sonchus oleraceus**	Common Sowthistle*
		Themeda australis	Kangaroo Grass
		Acacia filicifolia	Fern-leaved Wattle
	New England Stringybark Open Forest	*Allocasuarina torulosa*	Forest Oak
		*Andropogon virginicus**	Whisky Grass*
		Billardiera scandens	Hairy Apple Berry
		Dianella caerulea	Blue Flax Lily
		Entolasia marginata	Border Panic
		Entolasia stricta	Narrow Panic
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus caliginosa	Broad-leaved Stringybark
		Eucalyptus campanulata	New England Blackbutt
		Eucalyptus propinqua	Small-fruited Grey Gum
		Eucalyptus radiata	Narrow-leaved Peppermint
		Glycine clandestina	
		Hardenbergia violacea	
		Imperata cylindrica	Blady Grass
		Kennedia prostrata	Running Postman
		Leucopogon lanceolatus	
		Lomandra longifolia	Spiny-headed Mat Rush
		Pratia purpurascens	Whiteroot
		*Sonchus oleraceus**	Common Sowthistle*
		Themeda australis	Kangaroo Grass
		*Taraxacum officinale**	Dandelion*
		Xerochrysum bracteatum	Golden Everlasting
		Austrostipa scabra	Spear Grass
	Spotted Gum/Grey Box/Grey Ironbark Open Forest	*Corymbia henryi*	Large Spotted Gum
		Cheilanthes sieberi subsp. sieberi	Mulga Fern
		Cymbopogon refractus	Barbed Wire Grass
		Dichondra repens	Kidney Weed

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Eucalyptus tereticornis	Forest Red Gum
		Eucalyptus eugenioides	Thin-leaved Stringybark
		Eucalyptus siderophloia	Grey Ironbark
		Eragrostis curvula	African Love Grass*
		Hydrocotyle peduncularis	
		Figcus sp.	Fig
		Glycine clandestina	
		Imperata cylindrica	Blady Grass
		Lomandra longifolia	Spiny-headed Mat-rush
		Pimelea linifolia subsp. linifolia	Slender Rice Flower
		Poa sieberiana	Snow Grass
		*Senecio madagascariensis**	Fireweed*
		Acacia longifolia	
	Spotted Gum/ Grey Ironbark Dry Open Forest	*Bidens pilosa*	Cobblers Peg
		Breynia oblongifolia	Coffee Bush
		Corymbia henryi	Large Spotted Gum
		Dichondra repens	Kidney Weed
		Entolasia marginata	
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus tereticornis	Forest Red Gum
		Eucalyptus siderophloia	Grey Ironbark
		Eustrephus latifolius	Wombat Berry
		Glycine tabacina	
		Homalanthus populifolius	Bleeding heart
		*Lantana camara**	Lantana
		Lomandra filiformis	Wattle Mat-rush
		Melinis repens	Red Natal Grass
		Notelaea ovata	Native Holly
		Oplismenus aemulus	
		Plectranthus parviflorus	Cockspur Flower

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Pratia purpurascens	Whiteroot
		Themeda austrtalis	Kangaroo Grass
		*Verbena quadrangularis**	
		*Verbena bonariensis**	Purpletop*
	Spotted Gum/Grey Ironbark/Narrow-leaved Ironbark Open Forest	*Acacia falcata*	
		Acacia longifolia	
		Acacia terminalis	Sunshine Wattle
		Allocasuarina littoralis	Forest She-oak
		Andropogon virginicus	Whisky Grass
		*Bidens pilosa**	Farmer's Friend
		Breynia oblongifolia	Coffee Bush
		Cheilanthes sieberi subsp. sieberi	Mulga Fern
		Corymbia maculata	Spotted Gum
		Dicondra repens	Kidney weed
		Echinopogon ovatus	Forest hedge-hog Grass
		Entolasia marginata	
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus crebra	Narrow-leaved Ironbark
		Eustrephus latifolius	Wombat Berry
		Gahnia aspera	Rough Saw-sedge
		Geranium solanderi	Native Geranium
		Goodenia hederacea	Forest Goodenia
		Gomphocarpus physocarpus	Ballon Cotton Bush
		Glycine cladenstine	
		Imperata cylindrica	Blady Grass
		*Lantana camara**	Lantana*
		Lepidosperma laterale	
		Lomandra filiformis	Wattle Mat-rush
		Lomandra multiflora	Many-flowered Mat-rush
		Jacksonia scoparia	Dogwood

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Kennedia prostrata	Running Postman
		Melichrus urceolatus	Urn Heath
		Microlaena stipoides	Weeping Grass
		Pratia purpurascens	Whiteroot
		Persoonia sp.	Geebung
		Sonchus oleraceus	Common Sowthistle
		Themeda australis	Kangaroo Grass
	Spotted Gum/ Grey Ironbark/ Thin-leaved Stringybark Pink Bloodwood Open Forest	*Acacia linifolia*	White Wattle
		Acacia melanoxylon	Black Wattle
		Acacia concurrens	Curracabah
		Acacia terminalis	Sunshine Wattle
		Acacia implexa	Lightwood
		Alchornea ilicifolia	Native Holly
		Allocasuarina littoralis	Black She-oak
		Allocasuarina torulosa	Forest Oak
		Austrostipa ramosissima	Stout Bamboo Grass
		Bidens spp.*	Bidens
		Clematis glycinoides	Headache Vine
		Corymbia henryi	Large Spotted Gum
		Cymbopogon refractus	Barbed Wire Grass
		Corymbia maculata	Spotted Gum
		Dianella revoluta	Blue Flax Lily
		Dicondra repens	Kidney weed
		Epacris pulchella	Wallum Heath
		*Eragrostis curvula**	African Love Grass*
		Eucalyptus crebra	Narrow-leaved Ironbark
		Eucalyptus eugenoidies	
		Eucalyptus obliqua	Messmate
		Eucalyptus robusta	Swamp Mahogony
		Eucalyptus siderophloia	Grey Ironbark

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Exocarpos cupressiformis	Cherry Ballart
		Gahnia aspera	
		Hydrocotyle peduncularis	
		Jacksonia scorpodia	
		*Lantana camara**	Lantana*
		Imperata cylindrica	Blady Grass
		Kennedia prostrata	Running Postman
		Lomandra longifolia	Sydney Coastal Wattle
		Lomandra multiflora	Many-flowered Mat-rush
		Microlaena stipoides	Weeping Grass
		Persoonia levis	Broad-leaved Geebung
		Poa siberiana	Snowgrass
		Podolobium ilicifolium	Prickly Shaggy Pea
		Podolepis neglecta	
		Pomoderris	
		Pratia purpurascens	
		Styphelia viridis	
		Themeda australis	Kangaroo grass
		Xanthorrhoea latifolia	
	Thin-leaved Stringybark/ Broad-leaved Apple Open Forest	*Acacia terminalis*	Sunshine Wattle
		Angophora subvelutina	Broad-leaved Apple
		Cassinia uncata	Sticky Cassinia
		Cheilanthes sieberi	Mulga Fern
		Chrysocephalum semipapposum	Clustered Everlasting
		*Conyza sp.**	Fleabane*
		Cymbopogon refractus	Barbed Wire Grass
		*Cirsium vulgare**	Spear Thistle*
		Dicondra repens	Kidney Weed
		Elymus scaber	Wheat Grass
		Eragrostis curvula	African Love Grass

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Eucalyptus eugenioides	Thin-leaved Stringybark
		Eucalyptus tereticornis	Forest Red Gum
		Hydrocotyle peduncularis	
		*Hyparrhenia hirta**	Coolatai Grass*
		Lomandra multiflora	Many-flowered Mat-rush
		Lomandra longifolia	Spiny-headed Mat Rush
		Microlaena stipoides	Weeping Grass
		Oxalis perennans	
		Pteridium esculentum	Bracken
		*Rubus sp**	Blackberry*
		Verbena bonariensis	Purpletop
	New England Blackbutt Dry Heathy Open Forest	*Acacia filicifolia*	Fern-leaved Wattle
		Acacia longifolia subsp. sophorae	Coastal Wattle
		Acacia irrorata	Green Wattle
		Acacia obliquinervia	Mountain Hickory
		Acacia terminalis	Sunshine Wattle
		Allocasuarina torulosa	Forest Oak
		*Anagallis arvensis**	Scarlet Pimpernell
		*Andropogon virginicus**	Whisky Grass
		Angophora floribunda	Rough Barked Apple
		Angophora subvelutina	Broad-leaved Apple
		Austrostipa setacea	Corkscrew Grass
		Banksia integrifolia	Coast banksia
		Brachyscome rigidula	Hairy Cutleaf Daisy
		Calocephalus citreus	Lemon Beauty-heads
		*Capsella bursa-pastoris**	Shepherd's Purse
		Cheilanthes sieberi	
		Clematis glycinoides	Headache Vine
		*Conyza bonariensis **	Flaxleaf Fleabane
		Coronidium elatum	

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Cynodon dactylon	Couch
		Cyperus vaginatus	Stiff Flatsedge
		*Dactylis glomerata**	Cocksfoot
		Dendrophthoe vitellina	
		Desmodium varians	Slender Tick-trefoil
		*Eragrostis curvula**	African Lovegrass
		Erodium crinitum	Blue Storksbill
		Eucalyptus albens	White Box
		Eucalyptus andrewsii sub.sp andrewsii	New England Blackbutt
		Eucalyptus blakelyi	Blakely's Red Gum
		Eucalyptus campanulata	New England Blackbutt
		Eucalyptus macrorhyncha	Red Stringybark
		Eucalyptus nova-anglica	New England Peppermint
		Exocarpus cupressiformis	Native Cherry
		Gahnia aspera	Rough Saw-sedge
		Geranium solanderi	Native Geranium
		Glycine clandestina	
		*Hypochaeris radicata**	Catsear
		Imperata cylindrica	Blady Grass
		Jacksonia scoparia	Dogwood
		Juncus usitatus	
		Kennedia prostrata	Scarlet Coral Pea
		Leucopogon lanceolatus	
		Leucopogon melaleucoides	
		Lobelia trigonocaulis	Forest lobelia
		Monotoca scoparia	
		Persoonia stradbrokensis	
		*Phalaris aquatica **	Phalaris
		*Plantago lanceolata **	Lamb's Tongues

Vegetation Formation	Vegetation Community	*Scientific Name**	Common Name
		Poa siberiana	
		Pomaderris argyrophylla	Silver Pomaderris
		Pteridium esculentumm	Common Bracken
		Pultenaea hartmannii	
		Ranunculus lappaceus	Common Buttercup
		Rubus armeniacus (discolor) *	Blackberry
		Rubus parvifolius	Native Raspberry
		*Senecio madagascariensis**	Fireweed
		Styphelia viridis	
		Themeda australis	Kangaroo Grass
		Viola betonicifolia	Native Violet

H

Appendix H Fauna Survey Results

Fauna Survey Results per Community

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
Dry Sclerophyll Forest (shrub/grass)	Spotted Gum/Grey Box/Grey Ironbark Open Forest	Aves	*Acanthiza pusilla*	Brown Thornbill
		Aves	*Alisterus scapulairs*	Australian King-Parrot
		Aves	*Chenonetta jubata*	Australian Wood Duck
		Aves	*Colluricincla harmonica*	Grey Shrike-thrush
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Cracticus torquatus*	Grey Butcherbird
		Aves	*Dicaeum hirundinaceum*	Mistletoe Bird
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Eudynamys scolopacea*	Common Koel
		Aves	*Falcunculus frontatus*	Crested Shrike-tit
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Leucosarcia melanoleuca*	Wonga Pigeon
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Aves	*Malurus lamberti*	Variegatad Fairywren
		Aves	*Manorina melanophrys*	Bell Miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Ocyphaps (Geophaps) lophotes*	Crested Pigeon
		Aves	*Pardalotus punctatus*	Spotted Pardalote
		Aves	*Philemon citreogularis*	Little Friarbird
		Aves	*Philemon corniculatus*	Noisy Friarbird
		Aves	*Psophodes olivaceus*	Eastern Whipbird
		Aves	*Ptilonorhynchus violaceus*	Satin Bowerbird
		Mammalia	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Aves	*Rhipidura rufifrons*	Rufus Fantail
		Aves	*Sericornis magnirostris*	Large-billed Scrubwren

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Strepera graculina*	Pied Currawong
		Aves	*Tregellasia capito*	Pale Yellow Robin
		Aves	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet
		Aves	*Trichoglossus haematodus*	Rainbow Lorikeet
		Aves	*Tyto alba*	Barn Owl
Dry Sclerophyll Forest (shrubby)	New England Blackbutt/Peppermint and Red Mahogony Dry Open Forest	Aves	*Acanthiza pusilla*	Brown Thornbill
		Aves	*Aquila audax*	Wedge-tailed Eagle
		Aves	*Climacteris affinis*	White-browed Tree-creeper
		Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
		Aves	*Corcorax melanorhamphos*	White-winged Chough
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Falcunculus frontatus*	Crested Shrike-tit
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Manorina melanocephala*	Noisy miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Menura alberti*	Albert's Lyrebird
		Aves	*Monarcha melanopsis*	Black-faced Monarch
		Aves	*Orilus sagittatus*	Olive-backed Oriole
		Aves	*Pachycephala pectoralis*	Golden Whistler
		Mammalia	*Perameles nasuta*	Long-nosed Bandicoot
		Aves	*Philemon citreogularis*	Little Friarbird
		Aves	*Platycercus caledonicus*	Green Rosella
		Aves	*Platycercus elegans*	Crimson Rosella
		Mammalia	*Rattus sp.*	Rat sp.
		Aves	*Sericornis magnirostris*	Large-billed Scrubwren
		Aves	*Sterpera graculina*	Pied Currawong
		Mammalia	*Tachyglossus aculeatus*	Short-beaked Echidna

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Mammalia	*Trichosurus sp.*	Brushtail Possum sp.
		Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum
		Mammalia	*Vombatus ursinus*	Wombat
	Tumbledown Gum/Blakely's Red Gum/Pine Shrubby Forest	Aves	*Cacatua roseicapilla*	Galah
		Mammalia	*Macropus genus*	Wallaby sp.
	Youman's Stringybark/Yellow Box/Blakely's Red Gum Woodland	Aves	*Acanthiza regulodies*	Buff-rumped Thornbill
		Mammalia	*Antechinus stuartii*	Brown Antechinus
		Aves	*Artamus minor*	Dusky Woodswallow
		Aves	*Cacatua roseicapilla*	Galah
		Aves	*Climacteris affinis*	White-browed Tree-creeper
		Aves	*Colluricincla harmonica*	Grey Shrike-thrush
		Aves	*Corcorax melanorhamphos*	White-winged Chough
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Cracticus torquatus*	Grey Butcherbird
		Aves	*Dacelo novaeguineae*	Laughing Kookaburra
		Aves	*Eudynamys scolopacea*	Common Koel
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Aves	*Macropus parryi*	Whiptail Wallaby
		Aves	*Manorina melanocephala*	Noisy Miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Mammalia	*Mus musculus*	House Mouse
		Aves	*Ninox novaeseelandiae*	Southern Boobook
		Aves	*Ninox strenua*	Powerful Owl
		Aves	*Oryctolagus cuniculus*	European Rabbit
		Aves	*Oseudocherius peregrinus*	Common Ringtail Possum
		Mammalia	*Perameles nasuta*	Long-nosed Bandicoot
		Mammalia	*Petaurus nolfolcensis*	Squirrel Glider
		Aves	*Platycercus elegans*	Crimson Rosella

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Platycercus eximius*	Eastern Rosella
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Mammalia	*Rodent sp.*	Rodent Species
		Aves	*Sterpera graculina*	Pied Currawong
Forested Wetland	River Red Gum Riverine Woodland	Aves	*Acrocephalus stentoreus*	Clamorous Reed Warbler
		Aves	*Adea cinerea*	Grey Heron
		Aves	*Alcedo azurea*	Azure kingfisher
		Aves	*Anas castanea*	Chestnut Teal
		Mammalia	*Antechinus sp.*	Antechinus sp.
		Aves	*Apis melifera*	European Bee
		Aves	*Ardea novaehollandiae*	White-faced Heron
		Aves	*Ardea pacifica*	White-necked Heron
		Aves	*Aythya australis*	Hardhead
		Aves	*Bubulcus ibis*	Cattle Egret
		Aves	*Cacatua galerita*	Sulphur-crested Cockatoo
		Aves	*Cacatua roseicapilla*	Galah
		Mammalia	*Chalinolobus gouldii*	Gould's wattled bat
		Aves	*Charadrius (Elseyornis) melanops*	Black-fronted Dotterel
		Aves	*Chenonetta jubata*	Australian Wood Duck
		Aves	*Cisticola exilis*	Golden-headed Cisticola
		Aves	*Climacteris affinis*	White-browed Tree-creeper
		Aves	*Colluricincla harmonica*	Grey Shrike-thrush
		Aves	*Coracina papuensis*	White-bellied Cuckoo-shrike
		Aves	*Corcorax melanorhamphos*	White-winged Chough
		Aves	*Cormobates leucophaea*	White-throated Treecreeper
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Crinia parinsignifera*	Beeping Froglet
		Aves	*Cygnus atratus*	Black Swan

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Dacelo novaeguineae*	Laughing Kookaburra
		Aves	*Dendrocygna arcuata*	Wandering Whistling-Duck
		Aves	*Egretta garzetta*	Little Egret
		Aves	*Elanus axillaris*	Black-shouldered Kite
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Eudynamys scolopacea*	Common Koel
		Aves	*Eurystomus orientalis*	Dollarbird
		Aves	*Felis catus*	Feral Cat
		Aves	*Geopelia placidia*	Peaceful Dove
		Aves	*Gerygone mouki*	Brown Gerrygone
		Aves	*Glossopsitta pusilla*	Little Lorikeet
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Himantopus himantopus*	Black-winged Stilt
		Aves	*Hirundo neoxena*	Welcome Swallow
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Aves	*Lichenostomus penicillatus*	White-plumed Honeyeater
		Aves	*Limosa limosa*	Black-tailed Godwit
		Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Malurus splendens*	Splendid Fairywren
		Aves	*Manorina melanocephala*	Noisy miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Monarcha trivigatus*	Spectacled Monarch
		Aves	*Myiagra rubecula*	Leaden Flycatcher
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Ocyphaps (Geophaps) lophotes*	Crested Pigeon
		Mammalia	*Oryctolagus cuniculus*	European Rabbit
		Aves	*Pachycephala pectoralis*	Golden Whistler

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Pachycephala rufiventris*	Rufus Whistler
		Aves	*Pardalotus striatus*	Striated Pardalote
		Aves	*Pelecanus conspicillatus*	Australian Pelican
		Aves	*Pesphotus haematonotus*	Red Rumped Parrot
		Mammalia	*Petauroides volans*	Greater Glider
		Aves	*Phalacrocorax varius*	Pied Cormorant
		Aves	*Phaps chalcoptera*	Common Bronzewing
		Aves	*Philemon citreogularis*	Little Friarbird
		Aves	*Philemon corniculatus*	Noisy Friarbird
		Reptilia	*Physignathus lesueurii*	Eastern Water Dragon
		Aves	*Pitta versicolor*	Noisy Pitta
		Aves	*Platalea flavipes*	Yellow-billed Spoonbill
		Aves	*Platycercus elegans*	Crimson Rosella
		Aves	*Platycercus elegans flaveolus*	Yellow Rosella
		Aves	*Platycercus eximius*	Eastern Rosella
		Aves	*Podargus strigoides*	Tawny Frogmouth
		Aves	*Pomatostomus temporalis*	Grey Crowned Babbler
		Aves	*Psophodes olivaceus*	Eastern Whipbird
		Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox
		Mammalia	*Pteropus scapulatus*	Little Red Flying Fox
		Mammalia	*Rattus fuscipes*	Bush Rat
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Aves	*Rhipidura rufifrons*	Rufus Fantail
		Aves	*Sphecotheres viridis*	Fig bird
		Aves	*Stagonopleura guttata*	Diamond Firetail
		Aves	*Strepera graculina*	Pied Currawong
		Aves	*Struthidea cinerea*	Apostlebird
		Aves	*Sturnus vulgaris*	Common Starling

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Threskiornis molucca*	Australian White Ibis
		Aves	*Threskiornis spinicollis*	Straw-necked Ibis
		Aves	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet
		Aves	*Trichoglossus haematodus*	Rainbow Lorikeet
		Aves	*Vanellus miles*	Magpie-lark
		Aves	*Vanellus miles*	Masked Lapwing
		Mammalia	*Wallabia bicolor*	Swamp wallaby
	Swamp Box/Swamp Mahogany Swamp Forest (intergrade)	Mammalia	*Austronomus asutralis*	White-striped Mastrif Bat
		Mammalia	*Chalinolobus gouldii*	Gould's Wattled Bat
		Mammalia	*Miniopterus australis*	Little Bent-wing Bat
		Mammalia	*Nyctophilus sp*	Long eared bat species.
		Mammalia	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat
		Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail Bat
		Mammalia	*Scotorepens sp.*	Broadnosed bat species.
		Mammalia	*Vespadalus darlingtoni*	Large Forest Bat
		Mammalia	*Vespadelus troughtoni*	Eastern Cave Bat
Grassy Woodland	Blakely's Red Gum/Rough Barked Apple/Red Stringybark Grassy Open Forest	Aves	*Acanthiza regulodies*	Buff-rumped Thornbill
		Aves	*Aquila audax*	Wedge-tailed Eagle
		Aves	*Coracina papuensis*	White-bellied Cuckoo-shrike
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Lalage tricolor (sueurii)*	White-winged Triller
		Aves	*Lichenostomus penicillatus*	White-plumed Honeyeater
		Aves	*Manorina melanocephala*	Noisy Miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Neophema chrysogaster*	Turquoise Parrot
		Aves	*Pachycephala rufiventris*	Rufus Whistler
		Aves	*Pardalotus striatus*	Striated Pardalote

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Aves	*Smicrornis brevirostris*	Wee Bill
	Blakely's Red Gum/White Box Grassy Woodland	Aves	*Anas castanea*	Chestnut Teal
		Aves	*Aquila audax*	Wedge-tailed Eagle
		Aves	*Chenonetta jubata*	Australian Wood Duck
		Aves	*Glossopsitta pusilla*	Little Lorikeet
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Menura novaehollandiae*	Superb Lyrebird
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Oryctolagus cuniculus*	European Rabbit
		Mammalia	*Phascolarctos cinereus*	Koala
		Reptilia	*Physignathus lesueurii*	Eastern Water Dragon
		Aves	*Strepera graculina*	Pied Currawong
	Cabbage Gum Grassy Woodland	Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill
		Aves	*Acanthiza pusilla*	Brown Thornbill
		Aves	*Alisterus scapulairs*	Australian King-Parrot
		Aves	*Anthochaera carnunculata*	Red Wattlebird
		Aves	*Artamus minor*	Dusky Woodswallow
		Aves	*Bubulcus ibis*	Cattle Egret
		Aves	*Cacatua roseicapilla*	Galah
		Aves	*Calyptorhynchus funereus*	Yellow-tailed Black-Cockatoo
		Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Cracticus torquatus*	Grey Butcherbird
		Aves	*Entomyzon cuanotis*	Blue-faced Honeyeater

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Falco berigora*	Brown Falcon
		Mammalia	*Chalinolobus gouldii*	Gould's Wattled Bat
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Hirundo neoxena*	Welcome Swallow
		Aves	*Leucosarcia melanoleuca*	Wonga Pigeon
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo
		Mammalia	*Macropus parryi*	Whiptail Wallaby
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Manorina melanophrys*	Bell Miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Oryctolagus cuniculus*	European Rabbit
		Aves	*Pachycephala pectoralis*	Golden Whistler
		Aves	*Pardalotus punctatus*	Spotted Pardalote
		Aves	*Pardalotus striatus*	Striated Pardalote
		Mammalia	*Perameles nasuta*	Long-nosed Bandicoot
		Mammalia	*Petauroides volans*	Greater Glider
		Aves	*Petroica multicolor*	Scarlet Robin
		Reptilia	*Physignathus lesueurii*	Eastern Water Dragon
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Mammalia	*Rhinolophus megahyllus*	Eastern Hourseshoe Bat
		Aves	*Sericornis frontalis*	White-browed Scrubwren
		Aves	*Strepera graculina*	Pied Currawong
		Aves	*Threskiornis spinicollis*	Straw-necked Ibis
		Aves	*Vanellus miles*	Magpie-lark

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Vanellus miles*	Masked Lapwing
		Mammalia	*Vombatus ursinus*	Wombat
	Inland Grey Box Woodland	Mammalia	*Macropus genus*	Wallaby
		Mammalia	*Oryctolagus cuniculus*	European Rabbit
		Mammalia	*Sus scrofa*	Feral Pig
		Aves	*Vanellus miles*	Magpie-lark
	White Box Grassy Woodland	Aves	*Aanthus novaeseelandiae*	Australian Pipit
		Reptilia	*Amphibolurus gilberti*	Tar Tar Lizard
		Aves	*Aquila audax*	Wedge-tailed Eagle
		Aves	*Cacatua roseicapilla*	Galah
		Mammalia	*Capra hircus*	Feral Goat
		Aves	*Coracina maxima*	Ground Cuckoo-shrike
		Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Dacelo novaeguineae*	Laughing Kookaburra
		Aves	*Falco cenchroides*	Nankeen Kestrel
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo
		Mammalia	*Macropus rufogriseus*	Red Necked Wallaby
		Aves	*Neophema chrysogaster*	Turquoise Parrot
		Aves	*Ocyphaps lophotes*	Crested Pigeon
		Aves	*Oseudocherius peregrinus*	Common Ringtail Possum
		Aves	*Pesphotus haematonotus*	Red Rumped Parrot
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Mammalia	*Rodent sp.*	Rodent species
		Aves	*Strepera graculina*	Pied Currawong
		Aves	*Struthidea cinerea*	Apostlebird
		Aves	*Sturnus vulgaris*	Common Starling
		Aves	*Threskiornis spinicollis*	Straw-necked Ibis
		Aves	*Vanellus miles*	Masked Lapwing
		Reptilia	*Varanus varius*	Lace Monitor

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Mammalia	*Vulpes vulpes*	European Red Fox
		Mammalia	*Wallabia bicolor*	Black/Swamp Wallaby
Rainforest	Dry Land Rainforest	Aves	*Acanthiza pusilla*	Brown Thornbill
		Aves	*Alisterus scapularis*	Australian King-Parrot
		Aves	*Cacatua galerita*	Sulphur-crested Cockatoo
		Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
		Aves	*Cormobates leucophaea*	White-throated Treecreeper
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Falcunculus frontatus*	Crested Shrike-tit
		Mammalia	*Isoodon macrourus*	Northern Brown Bandicoot
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Menura alberti*	Albert's Lyrebird
		Mammalia	*Nyctophilus* sp.	Long-eared bat species
		Aves	*Pachycephala olivacea*	Olive Whistler
		Aves	*Petroica rosea*	Rose Robin
		Aves	*Pitta versicolor*	Noisy Pitta
		Aves	*Platycercus elegans*	Crimson Rosella
		Aves	*Ptilinopus superbus*	Superb Fruit-Dove
		Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Shealthtail Bat
		Aves	*Sericornis citreogularis*	Yellow-throated Scrubwren
		Aves	*Sericornis citreogularis*	Yellow-throated Thornbill
		Aves	*Sericornis frontalis*	White-browed Scrubwren
		Mammalia	*Tachyglossus aculeatus*	Short-beaked Echidna
		Mammalia	*Thylogale thetis*	Red-necked Pademelon
		Aves	*Trichoglossus haematodus*	Rainbow Lorikeet
		Mammalia	*Trichosurus caninus*	Mountain Brushtail Possum
		Mammalia	*Wallabia bicolor*	Swamp Wallaby
		Mammalia		Rodent sp.

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
Semi Arid Woodland	Silver-leaved Ironbark/White Cypress Pine Woodland	Aves	*Alisterus scapulairs*	Australian King-Parrot
		Aves	*Ardea alba*	Great Egret
		Aves	*Ardea novaehollandiae*	White-faced Heron
		Aves	*Cacatua galerita*	Sulphur-crested Cockatoo
		Aves	*Cacatua roseicapilla*	Galah
		Aves	*Calyptorhynchus funereus*	Yellow-tailed Black Cockatoo
		Aves	*Cervus* sp.	Feral Deer
		Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
		Aves	*Corcorax melanorhamphos*	White-winged Chough
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Dacelo novaeguineae*	Laughing Kookaburra
		Mammalia	*Equus caballus*	Wild Horses
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Lalage tricolor (sueurii)*	White-winged Triller
		Aves	*Lichenostomus penicillatus*	White-plumed Honeyeater
		Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo
		Aves	*Malurus splendens*	Splendid Fairywren
		Aves	*Manorina melanocephala*	Noisy Miner
		Aves	*Meliphaga lewinii*	Lewin's Honeyeater
		Aves	*Mirafra javanica*	Singing Bushlark
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Neophema chrysogaster*	Turquoise Parrot
		Aves	*Ocyphaps (Geophaps) lophotes*	Crested Pigeon
		Mammalia	*Oryctolagus cuniculus*	European Rabbit
		Aves	*Pesphotus haematonotus*	Red Rumped Parrot
		Mammalia	*Petaurus breviceps*	Sugar Glider
		Mammalia	*Petaurus norfolcensis*	Squirrel Glider
		Aves	*Platycercus elegans*	Crimson Rosella

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Platycercus eximius*	Eastern Rosella
		Aves	*Pomatostomus temporalis*	Grey Crowned Babbler
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Aves	*Sterpera graculina*	Pied Currawong
		Aves	*Struthidea cinerea*	Apostlebird
		Mammalia	*Sus scrofa*	Feral Pig
		Aves	*Tregellasia capito*	Pale Yellow Robin
		Aves	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet
		Aves	*Varanus gouldii*	Gould's Goanna
		Reptilia	*Varanus tristis*	Black headed Monitor
Semi-Arid Woodland	Ooline Forest	Aves	*Cacatua galerita*	Sulphur-crested Cockatoo
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Aves	*Struthidea cinerea*	Apostlebird
Opportunistic	Opportunistic (Eastern Study area)	Aves	*Acanthiza pusilla*	Brown Thornbill
		Aves	*Acridotheres tristis*	Common Myna
		Aves	*Alisterus scapularis*	Australian King-Parrot
		Aves	*Anthochaera carunculata*	Red Wattlebird
		Aves	*Aquila audax*	Wedge-tailed Eagle
		Aves	*Ardea pacifica*	White-necked Heron
		Aves	*Bubulcus ibis*	Cattle Egret
		Aves	*Cacatua galerita*	Sulphur-crested Cockatoo
		Aves	*Cacatua roseicapilla*	Galah
		Aves	*Calyptorhynchus funereus*	Yellow-tailed Black Cockatoo
		Mammalia	*Canis sp.*	Feral Dog (scat)
		Aves	*Centropus phasianinus*	Pheasant Coucal
		Aves	*Corcorax melanorhamphos*	White-winged Chough
		Aves	*Corvus coronoides*	Australian Raven
		Aves	*Cracticus nigrogularis*	Pied Butcherbird
		Aves	*Cracticus torquatus*	Grey Butcherbird

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Crinia signifera*	Striped/Common Marsh Frog
		Aves	*Dacelo novaeguineae*	Laughing Kookaburra
		Aves	*Dicrurus bracteatus*	Spangled Drongo
		Aves	*Entomyzon cuanotis*	Blue-faced Honeyeater
		Aves	*Eopsaltria australis*	Eastern Yellow Robin
		Aves	*Falco berigora*	Brown Falcon (pale morph)
		Aves	*Felis catus*	Feral Cat
		Mammalia	*Chalinolobus gouldii*	Goulds Wattled Bat
		Aves	*Grallina cyanoleuca*	Magpie-lark
		Aves	*Gymnorhina tibicen*	Australian Magpie
		Aves	*Hirundo neoxena*	Welcome Swallow
		Mammalia	*Isoodon macrourus*	Northern Brown Bandicoot
		Reptilia	*Lampropholis delicata*	Dark-flecked Garden Sunskink
		Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater
		Mammalia	*Macropus genus*	Wallaby
		Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo
		Mammalia	*Macropus parryi*	Whiptail Wallaby
		Mammalia	*Macropus robustus*	Common Wallaroo
		Aves	*Malurus cyaneus*	Superb Fairywren
		Aves	*Malurus lamberti*	Variegatad Fairywren
		Aves	*Manorina melanocephala*	Noisy Miner
		Aves	*Manorina melanophrys*	Bell Miner
		Mammalia	*Miniopterus australis*	Little bentwing Bat
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater
		Aves	*Ocyphaps (Geophaps) lophotes*	Crested Pigeon
		Mammalia	*Oryctolagus cuniculus*	European Rabbit
		Aves	*Pachycephala olivacea*	Olive Whistler
		Aves	*Pachycephala pectoralis*	Golden Whistler
		Aves	*Pardalotus punctatus*	Spotted Pardalote
		Aves	*Perameles nasuta*	Long-nosed Bandicoot
		Mammalia	*Phascolarctos cinereus*	Koala (scat)

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Philemon citreogularis*	Little Friarbird
		Aves	*Phylidonyris novaehollandiae*	New Holland Honeyeater
		Aves	*Platycercus elegans*	Crimson Rosella
		Aves	*Platycercus eximius*	Eastern Rosella
		Aves	*Podargus strigoides*	Tawny Frogmouth
		Aves	*Porphyrio porphyrio*	Purple Swamphen
		Reptilia	*Pseudechis porphyriacus*	Red-bellied Black Snake
		Aves	*Psophodes olivaceus*	Eastern Whipbird
		Aves	*Rhipidura fuliginosa*	Grey Fantail
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Aves	*Strepera graculina*	Pied Currawong
		Aves	*Sus scrofa*	Feral Pig
		Aves	*Taeniopygia bichenovii*	Double-barred Finch
		Aves	*Taeniopygia guttata*	Zebra Finch
		Aves	*Threskiornis molucca*	Australian White Ibis
		Aves	*Threskiornis spinicollis*	Straw-necked Ibis
		Mammalia	*Thylogale thetis*	Red-necked Pademelon
		Aves	*Trichoglossus haematodus*	Rainbow Lorikeet
		Aves	*Vanellus miles*	Masked Lapwing
		Aves	*Varanus varius*	Lace Monitor
		Mammalia	*Vespadelus regulus*	Southern Forest Bat
		Mammalia	*Vombatus ursinus*	Common Wombat
		Mammalia	*Vombatus ursinus*	Wombat (burrow)
		Mammalia	*Vulpes vulpes*	European Red Fox
	Opportunistic (Western Study area)	Mammalia	*Austronomus australis*	Whitestriped Mastif Bat
		Mammalia	*Chalinolobus gouldii*	Goulds Wattled Bat
		Aves	*Falco cenchroides*	Nankeen Kestrel
		Aves	*Hieraaetus morphnoides*	Little Eagle
		Aves	*Macropus giganteus*	Eastern Grey Kangaroo
		Mammalia	*Miniopterus orianae oceanensis*	Eastern Bentwing Bat
		Aves	*Myzomela sanguinolenta*	Scarlet Honeyeater

Vegetation Formation	Vegetation Community	Class	Scientific Name	Common Name
		Aves	*Neophema chrysogaster*	Turquoise Parrot
		Mammalia	*Nyctophilus sp.*	Long-eared Bat species
		Aves	*Rhipidura leucophrys*	Willie Wagtail
		Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail Bat
		Aves	*Struthidea cinerea*	Apostlebird
		Aves	*Threskiornis spinicollis*	Straw-necked Ibis
		Aves	*Vanellus miles*	Masked Lapwing
		Reptilia	*Varanus varius*	Lace Monitor
		Mammalia	*Vespadalus sp.*	Forest Bat species
		Mammalia	*Wallabia bicolor*	Black/Swamp Wallaby

Koala Sweep Survey Results

Vegetation Community	Primary/ Secondary Feed Tree and Abundance of Species	Frequency of scratch marks	Frequency of scats	Comments	Primary or Secondary Habitat
Western Study area					
Cabbage Gum Grassy Woodland	Primary Feed Trees: • *Eucalyptus amplifolia* (Cabbage Gum)- 8 mature trees; Secondary Feed Trees: • *E. blakelyi* (Blakely's Red Gum) - 7 mature trees.	1 tree (fresh markings)	No scat	1 recent koala sighting by land owner 3 weeks prior to survey.	Primary habitat based on high density of both the primary and secondary feed species within the community and recent sightings of koala's
River Red Gum Riverine Woodland	Primary Feed Trees: • *E. camaldulensis* (River Red Gum) - 8 mature trees. Secondary Feed Trees: • No secondary *feed* trees.	1 tree (fresh markings)	2 trees with scat present	Closest historical record occurs on the Mole River approximately 12km to the NW (Bionet 2009).	Primary habitat based on the high density of the primary feed tree in the community, the limited availability of habitat in the western slopes area due to clearing and historical records in0 the area.
White Box Grassy Woodland	Primary Feed Trees: • *E. albens* (White Box) - 8 *trees*. Secondary Feed Trees: • No secondary feed trees.	No markings	No scat	No Records	Secondary habitat (class B) based on the absence primary feed trees but presence of secondary feed trees.
River Red Gum Riverine Woodland	Primary Feed Trees: • *E. camaldulensis* (River *Red* Gum) - 5 mature trees. Secondary Feed *Trees*: • No secondary feed *trees*.	1 tree (old markings)	No scat	Closest historical record occurs on the Mole River approximately 15km to the NW (Bionet 2009).	Primary habitat based on the high density of the primary feed tree in the community, the limited availability of habitat in the western slopes area due to clearing and historical records in the general area.

Vegetation Community	Primary/ Secondary Feed Tree and Abundance of Species	Frequency of scratch marks	Frequency of scats	Comments	Primary or Secondary Habitat
Eastern Study area					
Grey Gum/Grey Ironbark Open Forest	Primary Feed Trees: • *E. tereticornis* (Forest Red Gum) - low numbers. Secondary Feed Trees: • *E. propinqua* (Small- Fruited Grey Gum) – High *density*	No markings	No scat	Numerous records both historical and recent occur within Girard State Forest (NSW State Forest 2009, Bionet 2009) Potential reasoning for the absence of koala activity in the results may be due to the extensive area of potential habitat available to local populations and the easy mobility between communities given the continuous fauna passage ways.	Secondary habitat (class A) based on high density of both the secondary feed species and low density of the primary feed species within the community and the abundance of recent and historical records.
Grey Ironbark/Grey Gum/New England Blackbutt Open Forest (Intergrade)	Primary Feed Trees: • *E. tereticornis* (*Forest* Red Gum) - low numbers. Secondary Feed Trees: • *E. propinqua* (Small- Fruited Grey Gum)- high *density*	No markings	No scat	Numerous records both historical and recent occur within Girard State Forest (NSW State Forest 2009, Bionet 2009) (NSW State Forest 2009, Bionet 2009) Potential reasoning for the absence of koala activity in the results may be due to the extensive area of potential habitat available to local populations and the easy mobility between communities given the continuous fauna passage ways.	Secondary habitat (class A) based on high density of both the secondary feed species and low density of the primary feed species within the community and the abundance of recent and historical records.

Vegetation Community	Primary/ Secondary Feed Tree and Abundance of Species	Frequency of scratch marks	Frequency of scats	Comments	Primary or Secondary Habitat
Cabbage Gum Grassy Woodland	Primary Feed Trees: • *Eucalyptus amplifolia* (Cabbage Gum)- high density of mature trees; • *E. tereticornis* (Forest Red Gum) - low *numbers* but mature trees.	No markings	No scat	Several records both historical and recent occur within 2km of this community to the N, NW and SW (Bionet 2009). Potential reasoning for the absence of koala activity in the results may be due to the extensive area of potential habitat available to local populations and the easy mobility between communities given the continuous fauna passage ways.	Primary habitat based on the presence of two primary feed species within the community and the abundance of recent and historical records.
Forest Red Gum/Pink Bloodwood Open Forest	Primary Feed Trees: • *E. tereticornis* (Forest Red Gum) - low numbers but mature trees. Secondary Feed Trees: • No secondary feed trees.	No markings	No scat	Several records both historical and recent occur within a few hundred meters of this community to the N, NW and SW (Bionet 2009) Potential reasoning for the absence of koala activity in the results may be due to the extensive area of potential habitat available to local populations and the easy mobility between communities given the continuous fauna passage ways.	Primary habitat based on the presence of primary feed species in high density within the community and the abundance of recent and historical records.

Appendix I Assessment of Significance for Threatened Flora, Fauna, Populations and Ecological Communities

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Assessments of Significance

1.1 Fauna

1.1.1 Birds of Prey: Spotted Harrier (*Circus assimilis*); Red Goshawk (*Erythrotriorchis radiatus*); Little Eagle (*Hieraaetus morphnoides*); and Square-tailed Kite (*Lophoictinia isura*).

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

Circus assimilis is known within in all of the relevant sub-regions of the Northern Rivers CMA and the Tenterfield Plateau sub-region of the Border Rivers/ Gwydir CMA, and is also predicted to occur within the Nandewar Northern Complex of the latter CMA area. There are previous records of this species in proximity to the alignment near Casino (alignment east). No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Erythrotriorchis radiatus is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. There are recent records of this species near around Kyogle and Casino (alignment east). No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Hieraaetus morphnoides is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. There are recent records of this species in proximity to the proposed alignment (study area west and east) to the west of Woodside, near Tenterfield, south of Mallanganee and Casino, and around Lismore. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Lophoictinia isura is known within relevant subregions of the Border Rivers/Gwydir CMA, and predicted and known within a number of sub-regions of the Northern Rivers CMA through which the study area passes. There are recent records of this species within Girard State Forest (between Sandy Hill and Drake), and south of Piora near Casino. No individuals of this species were observed during URS field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. his factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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*

Circus assimilis 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. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Circus assimilis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Erythrotriorchis radiatus occupies open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, *Melaleuca* swamp forest and riparian *Eucalyptus* forest of coastal rivers. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Erythrotriorchis radiatus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Hieraaetus morphnoides occurs within open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Hieraaetus morphnoides* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Lophoictinia isura occurs within a variety of timbered habitats including dry woodlands and open forests. This species shows a particular preference for timbered watercourses. In arid north-western NSW, *Lophoictinia isura* has been observed in stony country with a ground cover of chenopods and grasses, open *Acacia* scrub and patches of low open eucalypt woodland. Some of these habitats are typical of some of the bushland types found within the study area. The clearing of vegetation, some of which is consistent with *Lophoictinia isura* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Circus assimilis, Hieraaetus morphnoides or Lophoictinia isura.* A Recovery Plan has been prepared for *Erythrotriorchis radiatus*.

In lieu of a formalised recovery plan for *Circus assimilis*, DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Protect areas of habitat from development; and
- Retain and protect nesting and foraging habitat.

In lieu of a formalised recovery plan for *Hieraaetus morphnoides*, DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Protect known populations and areas of potential habitat from clearing, fragmentation or disturbance; and
- Retain and protect nesting and foraging habitat.

In lieu of a formalised recovery plan for *Lophoictinia isura*, DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Minimise activities such as clearing, logging, burning, and grazing of habitats resulting in a reduction in nesting and feeding resources; and
- Disturbance to or removal of potential nest trees near watercourses.

A Recovery Plan has been prepared for *Erythrotriorchis radiatus* (NSW NPWS, 2002). It outlines a range of long term and immediate objectives for this species. These include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Recovery actions outlined for *Erythrotriorchis radiatus* of relevance to this project include:

- Reduce use of pesticides;
- Protect known or potential nesting sites with substantial buffer zones;

- Identify and protect known and potential floodplain and riparian habitat from draining or clearing; and
- Protect known habitat from logging.

For all birds of prey species assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the birds of prey species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these birds of prey species. Disturbance and removal of potential nest trees near watercourses is a particular threat for birds of prey. Clearing and fragmentation of riparian forests and woodlands potentially leaves nests vulnerable. In the case of *Erythrotriorchis radiatus*, which usually nests in the tallest trees, nests can be exposed to storm damage and other disturbances when surrounding vegetation is removed.
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands; the loss or degradation of sources of permanent water through draining of wetlands has been identified as a threat for *Erythrotriorchis radiatus.*

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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1.1.2 Woodland Birds: Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*); Varied Sittella (*Daphoenositta chrysoptera*); Squatter Pigeon (*Geophaps scripta*); Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*); Speckled Warbler (*Pyrrholaemus saggitatus*); and Diamond Firetail (*Stagonopleura guttata)*.

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.*

Climacteris picumnus victoriae is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, as well as the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond-Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. This species was observed during URS surveys of the study area and there are recent records of this species in the vicinity of the alignment near Tabulam. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Daphoenositta chrysoptera is endemic and widespread in mainland Australia. There are recent records of this species across study areas west and east. Records include a sighting in close proximity to Dumaresq substation and around Bald Rock National Park near Tenterfield. There are recent records of this species within state forests and national parks in close proximity to the Alignment in study area east (within 5km). The species was recorded outside a reserve area in close proximity to the Alignment near Mummulgum, however no individuals of this species were observed during field surveys of the study area. Given the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Geophaps scripta is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA. There is one record of this species from approximately 10km to the south of the Dumaresq substation. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Pomatostomus temporalis temporalis is known to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. This species was observed during URS field surveys. Previous records of this species also exist for the area around Woodside (study area west), and south of Casino (study area east). This species was observed during URS field surveys. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Pyrrholaemus saggitatus is known and predicted to occur in the Nandewar, Northern Complex, and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA respectively. It is also known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Clarence Sandstones, Rocky River Gorge, Stanthorpe Plateau

and Woodenbong. There are previous records of this species in the general vicinity of the alignment from near Dumaresq substation to Drake. This bird was observed during URS field surveys. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Stagonopleura guttata is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA and throughout relevant sub-regions of the Northern Rivers CMA; Cataract, Clarence Lowlands, Clarence Sandstones, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions. This species has been recorded across study area west, including numerous records in proximity to the Mole River. No individuals of this species were observed during field surveys of the study area, nor has this species been recorded within close proximity to the proposed Alignment west or east. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Climacteris picumnus victoriae is found in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Climacteris picumnus victoriae* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Daphoenositta chrysoptera is found in eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Daphoenositta chrysoptera* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Geophaps scripta is found across grassy woodlands and plains, preferring sandy areas that are usually close to water. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Geophaps scripta* habitat, is not considered likely to further fragment or isolate the species, given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Pomatostomus temporalis temporalis inhabits open Box-Gum woodlands on slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. The clearing of vegetation, some of which is consistent with *Pomatostomus temporalis temporalis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Pyrrholaemus saggitatus is found across a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. The clearing of vegetation, some of which is consistent with *Pyrrholaemus saggitatus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Stagonopleura guttata is found in grassy eucalypt woodlands, including Box-Gum woodlands and Snow Gum *Eucalyptus pauciflora* woodlands. They also occur in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Stagonopleura guttata* habitat, is not considered likely to further fragment or isolate the species, given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the woodland bird species considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Climacteris picumnus victoriae* species recovery. The recovery strategies relevant to the Project include:

- Do not allow further loss of dead standing or fallen timber from firewood collection or on-farm practices such as 'tidying up'; do not allow removal of hollow-bearing dead or living trees and stumps on private and public lands.

In lieu of a formalised recovery plan, the DECCW has developed a number of priority actions and strategies to assist *Daphoenositta chrysoptera* in species recovery. The five key recovery strategies relevant to the Project include:

- Retain existing vegetation and remnant stands along roadsides and in paddocks;
- Increase the size of existing remnants by planting trees and establishing buffer zones;
- Where remnants have lost connective links, re-establish links by revegetating corridors or stepping stones;
- Limit firewood collection and retain dead timber in open forest and woodland areas; and
- Control weeds in areas of known habitat.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Geophaps scripta* in species recovery. The five key recovery strategies relevant to the Project include:

- Assist with the control of feral rabbits, cats and foxes;
- Manage fire in areas of potential habitat to maintain native grass cover;
- Protect grassy woodland areas from clearing, fragmentation or development;
- Expand and reconnect smaller fragments of habitat; and
- Report any sightings of the Squatter Pigeon in NSW to the DEC.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Pomatostomus temporalis temporalis* in species recovery. The two key recovery strategies relevant to the Project include:

- Retain existing woodland vegetation; and
- Retain dead timber on the ground in open woodland areas.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Pyrrholaemus saggitatus* in species recovery. The six key recovery strategies relevant to the Project include:

- NPWS should be consulted when planning development to minimise impact on populations;
- Retain dead timber on the ground in open woodland areas;
- Retain existing vegetation along roadsides, in paddocks and remnant stands of native trees;
- Increase the size of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants;
- Assess the importance of the site to the species' survival. Include the linkages the site provides for the species between ecological resources across the broader landscape; and
- Report any new sightings of the speckled warbler in NSW to the DEC.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Stagonopleura guttata* in species recovery. The four key recovery strategies relevant to the Project include:

- Retain dead timber on the ground in open woodland areas;
- Control weeds in areas of known habitat, especially the exotic, winter-fruiting shrubs such as cotoneasters, hawthorns, firethorns and privets that support Pied Currawongs;
- Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance; and

- Ensure remnant populations remain connected or linked to each other; in cases where remnants have lost connective links, re-establish links by revegetating sites to act as stepping stones for dispersal.

For all woodland birds assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening processes (TSC Act) have been identified as being relevant to the woodland bird species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and nesting sites habitat for all of these woodland bird species. A common threat across these woodland bird species is fragmentation of woodland habitat and connectivity caused by vegetation clearing. Some species are also threatened by habitat simplification including reductions in tree species diversity, tree canopy cover, shrub cover, ground cover, logs, fallen branches and litter.
- Removal of dead wood and dead trees; some woodland bird species forage within the understory and rely ground habitat features such as fallen timber and leaf litter. The removal of such habitat during the project could reduce potential habitat area within the study area.
- Invasion of native plant communities by exotic perennial grasses; a number of the woodland bird species are threatened by modification and destruction of ground- and shrub layers within habitat caused by removal of native plants, litter and fallen timber; introduction of exotic pasture grasses.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The construction of the easement across Alignment West as well as the augmentation of the existing 132kV easement across Alignment East may increase potential hunting grounds for local cat populations and put greater predation pressure on woodland bird populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The construction of the easement across Alignment West as well as the augmentation of the existing 132kV easement across Alignment East may increase potential hunting grounds for local fox populations and put greater predation pressure on local woodland bird populations.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW Scientific Committee (2001). Final determination. Brown Treecreeper (eastern subspecies) - Vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/BrownTreecreeperVulSpListing.htm

NSW Scientific Committee (2010) Final determination. Varied Sitella - vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/variedsittellaFD.htm

DECCW (2010). Threatened Species Profile. Squatter Pigeon. Viewed online 19/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10350

NSW Scientific Committee (2001) Final determination Grey-crowned babbler (eastern subspecies) – Vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/GreycrownedBabblerVulSpListing.htm

NSW Scientific Committee (2001) Final determination. Speckled warbler - Vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/SpeckledWarblerVulSpListing.htm

NSW Scientific Committee (2001) Final determination. Diamond firetail - Vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/DiamondFiretailVulSpListing.htm

1.1.3 Biiterns: Australasian Bittern (*Botaurus poiciloptilus*); and Black Bittern (*Ixobrychus flavicollis*).

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.*

Botaurus poiciloptilus is known to occur within the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA. No individuals of this species were observed during URS field surveys. There is a historical record of this species approximately 10km to the north of the alignment near Piora, and a more recent record in proximity to the Lismore Substation in Tatham. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ixobrychus flavicollis is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys of the area. There are recent records of this species in proximity to Casino and around Lismore (alignment east). The record from Casino shows close proximity to the Casino Substation. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Botaurus poiciloptilus favours permanent freshwater wetlands with tall, dense vegetation particularly bull rushes and spike rushes. The species breeds and foraging in emergent vegetation in freshwater or brackish waters. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Botaurus poiciloptilus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Ixobrychus flavicollis inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Ixobrychus flavicollis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the bitterns considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan for *Botaurus poiciloptilus*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Undertake fox and feral cat control in and nearby wetlands;
- Protect wetlands and water-courses from pollution; and
- Protect wetlands, ponds and associated marshy areas from clearing or disturbance.

In lieu of a formalised recovery plan for *Ixobrychus flavicollis* the DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Control of feral animals, in particular foxes and cats; and
- Protect and manage habitat, including fencing of riparian vegetation to prevent trampling and grazing by cattle.

For the bitterns assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening processes (TSC Act) have been identified as being relevant to the species included within this assessment:

- Clearing of native vegetation; the clearing of riparian vegetation would reduce potential breeding, foraging and shelter habitat for bittern species.
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands; identified as a key threatening process for *Botaurus poiciloptilus*. This species is threatened by changes to natural river flows as well as to the clearing, filling and draining of wetlands and watercourses for various anthropogenic activities.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local cat populations and put greater predation pressure on bittern populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local fox populations and put greater predation pressure on local bittern populations.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW, (2010). Threatened Species Profile. Australasian Bittern - profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10105

DECCW, (2005). Threatened Species Profile. Black Bittern – profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10441

1.1.4 Cockatoos: Red-tailed Black-Cockatoo (coastal subspecies) (*Calyptorhynchus banksii banksii*); and Glossy Black-Cockatoo (*Calyptorhynchus lathami)*.

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

Calyptorhynchus banksii banksii is known in the Clarence Lowlands and Richmond - Tweed sub-regions of the Northern Rivers CMA (however only four apparently valid records between 1980 and July 2009 exist for this species, all in the far north-east of the state); in the Tweed and Richmond Valleys: at Bungawalbin Nature Reserve, Round Mountain (Bogangar), Wilsons Creek (north of Alstonville), and at Cabarita. No Atlas sightings are recorded for this species. *Calyptorhynchus banksii banksii* was not observed during URS surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the

Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Calyptorhynchus lathami is endemic and widespread in mainland Australia. It is known to occur across all relevant sub-regions of the Northern Rivers and Border Rivers/Gwydir CMAs. There are numerous recent records of this species across study areas west and east. No individuals of this species were observed during URS survey. Given the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable.; This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Calyptorhynchus banksii banksii is found from dry open forest and mixed rainforest-eucalypt forest. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Calyptorhynchus banksii banksii* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Calyptorhynchus lathami inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak, Forest She-oak or Drooping She-oak occur. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Calyptorhynchus lathami* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the cockatoo species considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Calyptorhynchus banksii banksii* species recovery. The three recovery strategies relevant to the Project include:

- Retain remaining suitable habitat, especially protecting and enhancing areas with hollow-bearing trees and with potential recruitment of future hollow-bearing trees;
- Protect identified nesting sites; and
- Increase connectivity and size of remnant patches of suitable habitat.

In lieu of a formalised recovery plan, the DECCW has developed a number of priority actions and strategies to assist *Calyptorhynchus lathami* in species recovery. The five key recovery strategies relevant to the Project include:

- Protect existing and future hollow-bearing trees for nest sites;
- Retain and protect areas of native forest and woodland containing she-oaks; and
- Establish forested corridors linking remnant areas of habitat; include local she-oak species in bush revegetation works.

For both cockatoo species assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.*

The following key threatening processes (TSC Act) have been identified as being relevant to the woodland bird species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could degrade available habitat by reducing potential breeding, foraging and nesting sites for both cockatoo species.
- Removal of dead wood and dead trees; the loss of large trees and even dead trees or stags containing suitable hollows for breeding has been identified as a threat.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW Scientific Committee (2009) Final determination. Red-tailed Black-Cockatoo (coastal subspecies) *Calyptorhynchus banksii banksii* - critically endangered species listing http://www.environment.nsw.gov.au/determinations/redtailedblackcocatoocostfd.htm

DECCW, (2005). Threatened Species Profile. Glossy Black-cockatoo – profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10140

1.1.5 Spotted-tailed Quoll (Dasyurus maculatus); Brush-tailed Phascogale (Phascogale tapoatafa) and Common Planigale (Planigale maculata).

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.

Dasyurus maculatus (Vulnerable, TSC Act; Endangered, EPBC Act) is found on the east coast of NSW, Tasmania, eastern Victoria and north-east Queensland. The female of the species occupy home ranges up to about 750 hectares and the males up to 3,500 hectares. The species utilise den sites in habitat features such as hollow bearing trees, fallen timber and small caves (DEC, 2005). The Project has the potential to impact on potential habitat of the species, with the removal of vegetation and habitat features. However, considering the highly mobile nature of the species, and the large home range used, it is considered unlikely that the Project would have an adverse effect on the life cycle of *Dasyurus maculatus* such that a viable local population is placed at risk of extinction.

Phascogale tapoatafa (Vulnerable, TSC Act) has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Females have exclusive territories of approximately 20 – 60 ha, while males have overlapping territories of up to 100 ha. The species use hollow bearing trees as nest and shelter sites. The Project has the potential to impact on potential habitat of the species, with the removal of vegetation and habitat features. However, considering the species utilises numerous trees within short periods of time, it is considered unlikely that the Project would have an adverse effect on the life cycle of *Phascogale tapoatafa* such that a viable local population is placed at risk of extinction.

Planigale maculata (Vulnerable, TSC Act) occur in coastal north-east NSW, coastal east Queensland and Arnhem Land. The species builds nests in crevices, hollow logs, beneath bark or under rocks. The Project has the potential to impact on potential habitat for this species through the removal of habitat features and vegetation clearing. Assuming mitigation measures are adopted, the Project is unlikely to affect the life cycle of *Planigale maculata* such that a viable local population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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.*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically

endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Dasyurus maculatus is found across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' highly mobile nature, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Phascogale tapoatafa prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. The species also inhabit heath, swamps, rainforest and wet sclerophyll forest. The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. The habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Planigale maculata inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, usually close to water. The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement.The habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Dasyurus maculatus*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Undertake cat and fox control using poison-baiting techniques least likely to affect quolls; and
- Retain and protect large, forested areas with hollow logs and rocky outcrops, particularly areas with thick understorey or dense vegetation along drainage lines.

To date, no formal recovery plan has been developed for *Phascogale tapoatafa*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Undertake fox and feral cat control;

- Provide nest boxes in areas where tree-hollows have been removed;
- Retain and protect habitat, particularly mature or old growth forest containing hollow-bearing trees; and
- Retain nest trees and recruitment trees (future hollow-bearing trees).

To date, no formal recovery plan has been developed for *Planigale maculata*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Reduce the impact of burning to retain diverse understorey species and cover, such as hollow logs and bark; and
- Protect areas of habitat from clearing and development.

Assuming mitigation measures are adopted, the potential threats to these species that may result from works associated with the Project will be minimised.

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.

The Project may result in an increase to the following key threatening processes, which are considered relevant to all species included within this assessment:

- Bushrock removal; bushrock is a key habitat resource for these species, providing important den and shelter habitats. The Project will result in the removal of and disturbance to some bushrock from within the Project area.
- Clearing of native vegetation; the Project will require clearing of native vegetation, some of which constitutes habitat for the species included within this assessment.
- Loss of hollow-bearing trees; hollow bearing trees are a key habitat resource for these species, providing important den and shelter habitats. The Project will result in the removal of and disturbance to some hollow bearing trees from within the Project area.
- Removal of dead wood and dead trees; dead wood, trees and coarse woody debris is potential habitat for the species within this assessment. The Project will result in the reduction of dead wood and trees from within the easement, which will in turn reduce potential habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Spotted-tailed Quoll – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10207

DEC (2005). Brush-tailed Phascogale – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10613

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1.1.6 Little Bentwing-bat (*Miniopterus australis*); Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

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.

Miniopterus australis (Vulnerable, TSC Act) is distributed along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW (DEC, 2005). Field surveys conducted throughout the study area using echolocation detection surveys noted a "probable" record of this species. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Miniopterus schreibersii oceanensis (Vulnerable, TSC Act) occur along the east and north-west coasts of Australia (DEC, 2005). Field surveys conducted throughout the study area using echolocation detection surveys noted a "possible" record of this species. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Saccolaimus flaviventris (Vulnerable, TSC Act) is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes (DEC, 2005). Field surveys conducted throughout the study area using echolocation detection surveys noted a "possible" record of this species. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Miniopterus australis inhabit moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, *Melaleuca* swamps, dense coastal forests and *Banksia* scrub. The species is generally found in well-timbered areas. The species roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species wide distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Miniopterus schreibersii oceanensis use caves as their primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. The species hunt in forested areas, catching moths and other flying insects above the tree tops (DEC, 2005). The Project may require the removal of potential foraging habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species wide distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Saccolaimus flaviventris typically roost in tree hollows and buildings. However, in treeless areas they are known to utilise mammal burrows. The species forages in most habitats across its very wide range (DEC, 2005). The Project may require the removal of potential foraging habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species wide distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Miniopterus australis*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Retain stands of native vegetation, particularly within 10km of roosts; and
- Protect known roosting and nursery sites and surrounding forest from disturbance by restricting and/or monitoring access.

To date, no formal recovery plan has been developed for *Miniopterus schreibersii oceanensis*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Retain native vegetation around roost sites, particularly within 300 m of maternity caves;
- Minimise the use of pesticides in foraging areas; and

- Protect roosting sites from damage or disturbance.

To date, no formal recovery plan has been developed for *Saccolaimus flaviventris*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project

- Conduct searches for the species in suitable habitat in proposed development areas;
- DEC should be consulted when planning development/s to minimise impact/s on populations;
- Retain stands of native vegetation, especially those with hollow-bearing trees (including dead trees), and retain other structures containing bats;
- Retain a buffer of vegetation around roost sites in vegetated areas;
- Protect hollow-bearing trees for breeding sites, including those on farmland; younger mature trees should also be retained to provide replacements for the older trees as they die and fall over;
- Encourage regeneration and replanting of local flora species to maintain bat foraging habitat; and
- Assess the site's importance to the species' survival, including linkages provided between ecological resources across the broader landscape.

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.

The Project may result in an increase to the following key threatening processes, which are considered relevant to all species included within this assessment:

- Clearing of native vegetation; the Project will require clearing of native vegetation, some of which constitutes roosting and/or foraging habitat for the species included within this assessment.
- Loss of hollow-bearing trees; hollow bearing trees are a key habitat resource for these species, providing important roost and shelter habitats. The Project will result in the removal of and disturbance to some hollow bearing trees from within the Project area.
- Removal of dead wood and dead trees; dead wood, trees and coarse woody debris is potential habitat for the species within this assessment. The Project will result in the reduction of dead wood and trees from within the easement, which will in turn reduce potential habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Little Bentwing-bat – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10533

DEC (2005). Eastern Bentwing-bat – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10534

DEC (2005). Yellow-bellied Sheathtail-bat – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10741

1.1.7 Purple Spotted Gudgeon (*Mogurnda adspersa*)

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.

Mogurnda adspersa (Endangered, FM Act) occur in inland drainages of the Murray-Darling basin as well as in coastal drainages of northern NSW and Queensland. Females can spawn several times, with adhesive eggs being deposited in a cluster on a hard surface in a waterway and hatching three to eight days later. Several records of this species exist within the study area west within Tenterfield Creek. Assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Mogurnda adspersa are found in slow-moving or still waters of rivers, creeks and billabongs, often amongst weeds, rocks or large woody debris. The Project will require the upgrade or installation of water crossings throughout the Project area, which may result in some disturbance to potential *Mogurnda adspersa* habitat. Several waterways within the Project area are already spanned by various crossing structures, both formal and informal (e.g. those associated with farm access tracks). Assuming mitigation measures are adopted and given the presence of existing crossings, it is considered unlikely that the Project would result in significant fragmentation or isolation of *Mogurnda adspersa* habitat from other areas of habitat. The habitat that may be impacted by the Project is not considered to be of high importance to the long-term survival of the species in the locality, as the disturbance will be limited in extent, and minimised by mitigation measures recommended in **Section 7**.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No formal recovery plan exists for *Mogurnda adspersa*. In Lieu of a recovery plan, the DII have developed the following recovery action relevant to the Project:

- Promote appropriate land management practices to improve water quality and river health (NSW DII, 2005).

Assuming mitigation measures are implemented, the Project will not conflict with the recovery strategies this species.

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

The following key threatening processes (under the TSC Act) have been identified as being relevant to *Mogurnda adspersa*:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands; any changes to the natural flow of waterways within the Project area may limit the potential of this species from moving throughout the locality.
- Predation by *Gambusia holbrooki*; this species is threatened by predation by the invasive species *Gambusia holbrooki*.
- Removal of dead wood and dead trees; dead wood within rivers is likely to provide potential habitat for this species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW DII, (2005). Purple spotted gudgeon. Profiles for species, populations & ecological communities. Primary Industries, Fishing and Aquaculture. Viewed online 19/11/2010. http://pas.dpi.nsw.gov.au/Species/Species_Profile.aspx?SpeciesListingID=18

1.1.8 Forest Birds: Bush Stone-curlew (*Burhinus grallarius*); Barred Cuckoo-shrike (*Coracina lineata*); Eastern Bristlebird (*Dasyornis brachypterus*); Albert's Lyrebird (*Menura alberti*); White-eared Monarch (*Monarcha leucotis*); and Olive Whistler (*Pachycephala olivacea*).

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*

Burhinus grallarius is known to occur in the Stanthorpe Plateau and Clarence Lowlands sub-regions of the Northern Rivers CMA. It is also predicted to occur in the Nandewar Northern Complex sub-region of the Border Rivers/ Gwydir CMA. There is a historical record of this species approximately 25km to the south of the proposed alignment south of Drake, within Washpool National Park. A number of more recent records exist for this species outside of

reserve areas south of Tatham and around Ruthven. No individuals of this species were observed during field surveys of the study area. Given the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Coracina lineata is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. There are historical records of this species in proximity to the proposed alignment within Mallanganee National Park and Richmond Range National Park (alignment east). The Project will not intersect either of these National Parks. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Dasyornis brachypterus is known in the Richmond - Tweed sub-region of the Northern Rivers CMA. There is one recent record of this species approximately 10km to the north of the proposed alignment near Black Swamp; within the Boodoo State Forest/ Basket Swamp National Park. The alignment will not transect this area, and no individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Menura alberti is known to occur within the region of the Clarence Lowlands relevant to the study area as well as the Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. The species was recently recorded in close proximity to the proposed alignment within the Basket Swamp National Park (study area west). The alignment will not transect the National Park, and no individuals of this species were observed during field surveys of the study area. Given the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Monarcha leucotis is known within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. The species was recently recorded approximately 10km to the north of the proposed alignment adjacent to the Richmond national Park and near Casino (study area east). No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Pachycephala olivacea is known to occur within the Richmond - Tweed sub-region of the Northern Rivers CMA. It was observed during URS surveys. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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*

Burhinus grallarius is found in open forests and woodlands with a sparse grassy ground layer and fallen timber. The species breeds and forages in grassy woodland and fallen dead timber. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Burhinus grallarius* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Coracina lineata occurs within rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Coracina lineata* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Dasyornis brachypterus occurs within dense low vegetation including heath and open woodland with a heathy understorey. In northern NSW it occurs in open forest with tussocky grass understorey. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Dasyornis brachypterus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Menura alberti mainly occurs in the wettest rainforests or wet sclerophyll forests with a wet understorey, often of rainforest plants. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with

Menura alberti habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Monarcha leucotis occurs in rainforest, especially drier types, such as littoral rainforest, as well as wet and dry sclerophyll forests, swamp forest and regrowth forest. They appear to prefer the ecotone between rainforest and other open vegetation types or the edges of rainforest, such as along roads. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Monarcha leucotis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Pachycephala olivacea inhabits wet forests above about 500m. These habitats are typical of some of the bushland found within study area east. The clearing of vegetation, some of which is consistent with *Pachycephala olivacea* is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Coracina lineata, Dasyornis brachypterus, Menura alberti, Monarcha leucotis* or *Pachycephala olivacea.* A Recovery Plan has been prepared for *Burhinus grallarius*.

In lieu of a formalised recovery plan for *Coracina lineata*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Retain areas of native forest;
- Retain forest corridors particularly along roads and watercourses; and
- Retain individual native fruit-bearing trees as feed trees.

In lieu of a formalised recovery plan for *Dasyornis brachypterus*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The four key recovery strategies relevant to the proposed development include:

- Implement fire management strategies that enhances habitat for the Eastern Bristlebird. If hazard reduction burning is necessary it should be carried out in a mosaic pattern at a frequency of no less than 10-15 years. Hazard reduction burns may also be necessary to protect large amounts of habitat from too-frequent and intense fire events. Ensure that personnel planning and undertaking hazard reduction burns are able to identify the species and are aware of its habitat;
- Searches for the species should be conducted in suitable habitat in proposed development areas;
- Raise driver awareness through road signs about the presence of Eastern Bristlebirds; and
- Continue to control Bitou Bush, Lantana and other invasive weeds that pose a threat to Eastern Bristlebird habitats.

In lieu of a formalised recovery plan for *Menura alberti*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Rehabilitate and reconnect patches of known and potential habitat using wide corridors linking gullies and ridges;
- Protect all known and potential habitat from further clearing, disturbance and isolation close to potential or known habitat; and
- Control Red Foxes and feral and domestic Dogs and Cats.

In lieu of a formalised recovery plan for *Monarcha leucotis*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Control weeds in areas of known and potential habitat or on land bordering such habitat;
- Protect areas of known and potential habitat from clearing and further fragmentation and isolation, including patches on private land in collaboration with landholders; and
- Reconnect or enlarge patches of known and potential habitat, particularly using corridors along rivers and creeks.

In lieu of a formalised recovery plan for *Pachycephala olivacea*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Undertake fox and feral cat control programs.
- Retain and protect known and likely habitat.

A Recovery Plan has been prepared for *Burhinus grallarius* (DEC 2006). It outlines a range of long term and immediate objectives for this species. These include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Recovery actions outlined for *Burhinus grallarius* of relevance to this project include:

- Undertake fox and feral cat control programs;
- Retain dead timber on the ground in open woodland areas;
- Retain existing vegetation along roadsides, in paddocks and remnant stands of native trees;
- Fence off nesting sites;
- Fence off suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer; and
- Increase the size of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants.

For all forest birds assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the forest bird species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these forest bird species. Vegetation clearing and increasing habitat fragmentation is a common threat to these forest birds. Fragmentation and isolation of populations may adversely affect the species because of their small size which makes them susceptible to catastrophic events and localised extinction.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local cat populations and put greater predation pressure on bittern populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local fox populations and put greater predation pressure on local bittern populations.
- Removal of dead wood and dead trees; this is identified as a key threat for *Burhinus grallarius* which relies on dead timber for habitat. Retaining dead timber is listed as a key recovery measure for this species.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.9 Geese and Ducks: Magpie Goose (*Anseranas semipalmata*); and Freckled Duck (*Stictonetta naevosa).*

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

Anseranas semipalmata is known to occur within the Clarence Lowlands, Clarence Sandstones, Richmond – Tweed and Woodenbong sub-regions of the Northern Rivers CMA. There is a previous record of this species approximately 5km to the south of the existing Tenterfield 132kV substation (alignment west) as well as a number of records from around Casino (alignment east). No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across alignment east as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Stictonetta naevosa is predicted to occur within the Nandewar, Northern Complex sub-region of the Border Rivers/Gwydir CMA and known to occur within the Richmond - Tweed and Clarence Lowlands sub-regions of the Northern Rivers CMA. There are numerous records of this species in proximity to alignment east near Casino. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across alignment east as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Anseranas semipalmata are mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. The species is equally at home in aquatic or terrestrial habitats, and often seen walking and grazing on land. Their activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off. These habitats are typical of some found within study area east. Proposed project activities at locations consistent with *Anseranas semipalmata* habitat is not considered likely to further fragment or isolate the species given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

Stictonetta naevosa inhabits a variety of plankton-rich wetland types, as well as large open lakes, creeks, farm dams, sewage ponds and floodwaters. These habitats are typical of some found within study area east. Proposed project activities at locations consistent with *Stictonetta naevosa* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the geese and duck species considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Anseranas semipalmata* species recovery. The three key recovery strategies relevant to the Project include:

- Undertake predator control in known wetland breeding sites;
- Protect wetlands from water pollution by reducing the use of chemicals, monitoring of salinity levels and nutrient loading near wetlands; and
- Maintain or restore natural flow regimes in wetlands.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Stictonetta naevosa* species recovery. The two key recovery strategies relevant to the Project include:

- Retain and protect wetlands and maintain a natural density of riparian and wetland vegetation; and
- Retain or reintroduce ecologically sustainable water flows to swamp, wetland and creek habitat.

For the goose and duck species assessed, assuming mitigation measures are adopted, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the geese and duck species included within this assessment:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands – this key threatening process is common across the two species assessed. Both are threatened by changes to natural river flows as well as to the clearing, filling and draining of wetlands and watercourses for various anthropogenic activities.

The project would involve the upgrade and construction of a number of new watercourse crossings as identified within **Appendix E** of the EA (Volume II).

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005). Threatened Species Profile. Magpie Goose. Viewed online 19/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10056

NSW NPWS (1999). Threatened Species Information - The Freckled Duck. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/resources/nature/tsprofileFreckledDuck.pdf

DECCW (2005). Threatened Species Profile. Freckled Duck – profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10771

1.1.10 Honeyeaters: Painted Honeyeater (*Grantiella picta*); Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*); and Regent Honeyeater (*Xanthomyza phrygia*).

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

Grantiella picta is known within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, known within the Rocky River Gorge sub region and predicted within the Stanthorpe Plateau sub-region of the Northern Rivers CMA. There is one record of this species from 1992 within the Girard State Forest in proximity of alignment east near Drake. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Melithreptus gularis gularis is known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is predicted to occur within the Cataract, Rocky River Gorge and Stanthorpe Plateau sub-regions of the Northern Rivers CMA, as well as being known within the Clarence Lowlands, Clarence Sandstones and Woodenbong subregions. There are recent records of this species near Bonshaw and the Torrington State Forest within study area west, as well as a number of records for this species approximately 10km south of Tabulam and Casino (study area east). No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would

have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Xanthomyza phrygia is known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA (respectively), as well as being known or predicted within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. There are no recent records of this species within study area west. The species was recently recorded in close proximity to the proposed Alignment within the Mallanganee National Park (study area east). The Alignment will not transect the National Park, and no individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Grantiella picta occurs within Dry Sclerophyll Forests and inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Grantiella picta* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Melithreptus gularis gularis occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with

Melithreptus gularis gularis habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Xanthomyza phrygia occurs within box-ironbark eucalypt associations along creek flats, broad river valleys and lower slopes. Along streams in NSW, riparian forests of River She-oak *Casuarina cunninghamiana* are also important for feeding and breeding. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Xanthomyza Phrygia* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Grantiella picta* or *Melithreptus gularis gularis.* A Recovery Plan has been prepared for *Xanthomyza phrygia*.

In lieu of a formalised recovery plan for *Grantiella picta*, DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Protect remnant woodland and open forest throughout the range of the species; and
- Regenerate and replant local flora species to maintain breeding and foraging habitat.

In lieu of a formalised recovery plan for *Melithreptus gularis gularis*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Retain suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer; and
- Increase the size and connectivity of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants.

A Recovery Plan has been prepared for *Xanthomyza phrygia* (Menkhorst *et al*., 1999). It outlines a range of long term and immediate objectives for this species. These include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Recovery actions outlined for *Xanthomyza phrygia* of relevance to this project include:

- No loss of mature key nectar tree species. Minimise the removal of mistletoes at key sites.
- Protect and enhance key breeding and foraging habitats.
- Encourage natural regeneration and increase the remnant size of known and potential Regent Honeyeater habitats.
- No further loss of known woodland and forest habitat throughout the range of the Regent Honeyeater from developments.

For all of the honeyeaters assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the honeyeater species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these honeyeater bird species. Removing important feed trees, in particular large, old trees with heavy mistletoe infestations, would limit the food resources available for these species. Vegetation clearing and increasing habitat fragmentation may increase competition from larger aggressive honeyeaters, particularly Noisy Miners, Noisy Friarbirds and Red Wattlebirds. *Grantiella picta, Melithreptus gularis gularis* and *Xanthomyza phrygia* could potentially be excluded from smaller remnants.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW, (2010). Threatened Species Profile. Painted Honeyeater. Viewed online 19/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10357

NSW Scientific Committee, (2001) Final determination. Black-chinned honeyeater (eastern subspecies) - Vulnerable species listing. Viewed online 19/11/2010. http://www.environment.nsw.gov.au/determinations/BlackchinnedHoneyeaterVulSpListing.htm

Menkhorst, P., Schedvin, N. and Geering, D., (1999). Regent Honeyeater (*Xanthomyza phrygia*) Recovery Plan 1999-2003. Viewed online 19/11/2010. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/regent-h-eater/index.html#14

1.1.11 Hylidae – Tree Frogs: Green-thighed Frog (*Litoria brevipalmata*), Peppered Frog (*Litoria piperata*), and Glandular Frog (*Litoria subglandulosa*).

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

Litoria brevipalmata is known to occur within the Clarence Lowlands, Cataract, Richmond – Tweed (QLD – Scenic Rim) (Part A) and Woodenbong sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area, nor has this species been recorded historically within the Project area. Potential breeding habitat occurs in the flood prone grassy areas between Tabulam and Casino following heavy rainfall in late spring and summer. The proposed action may result in impacts including vegetation clearing and hydrological changes caused by the establishment of creek and swampy area crossings to gain access to structures. Given the existing 132kV easement and associated access tracks and the presence of suitable habitat outside the

Project area, the removal of potential *Litoria brevipalmata* habitat is not considered likely to place a viable local population at risk of extinction.

Litoria piperata is predicted to occur in the Stanthorpe Plateau sub-region of the Northern Rivers CMA restricted to elevations 800m ASL. No individuals of this species were observed during field surveys conducted throughout the study area, nor has this species been recorded historically within the Project area. The proposed action may result in environmental impacts including vegetation clearing and general habitat modification. Given the existing 132kV easement and associated access tracks and the presence of suitable habitat outside the Project area, the removal of potential *Litoria piperata* habitat is not considered likely to place a viable local population at risk of extinction.

Litoria subglandulosa is predicted to occur in the Stanthorpe Plateau and Rocky River Gorge sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area, nor has this species been recorded historically within the Project area. The proposed action may result in environmental impacts including vegetation clearing and general habitat modification. Given the existing 132kV easement and associated access tracks and the presence of suitable habitat outside the Project area, the removal of potential *Litoria subglandulosa* habitat is not considered likely to place a viable local population 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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Litoria brevipalmata habitat includes rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. Breeding frogs gather around grassy semi-permanent ponds and flood-prone grassy areas (DEC, 2005). This species has the potential to occur within the following vegetation communities within the study area:

- Grey Gum/Grey Box/Grey Ironbark/Spotted Gum open forest and all variations of these communities;
- Swamp Box/Swamp Mahogany swamp forest, Cabbage Gum open forest or woodland;
- Forest Red Gum - Swamp Box;
- Spotted Gum - Brush Box moist forest; and
- Sydney Blue Gum open forest.

The clearing of vegetation, some of which is consistent with *Litoria brevipalmata* habitat, is not considered to further fragment or isolate the already fragmented vegetation (and hence *Litoria brevipalmata* habitat) that occurs within the Project area. Given that *Litoria brevipalmata* has not been recorded historically throughout the Project area, the potential habitat within the Project area is not considered to be important to the long-term survival of the species.

Litoria piperata habitat includes streamside vegetation and shelter sites under rocks and fallen timber along rocky streams flowing eastward from the Tablelands, at an altitude above 800m (NSW National Parks and Wildlife Service, 2001). Within the study area the River Oak riparian woodland vegetation community is likely to provide habitat for this species. Clearing a small amount of this vegetation within the alignment is not considered to further fragment or isolate the already fragmented vegetation (and hence *Litoria piperata* habitat) that occurs within the Project area. Given that *Litoria piperata* has not been recorded historically throughout the Project area, the potential habitat within the Project area is not considered to be important to the long-term survival of the species.

Litoria subglandulosa habitat includes streams found within rainforest as well as moist and dry eucalypt forest. Breeding habitat comprises permanent streams or swamps with fringing vegetation such as ferns, tussocks, sedges, whilst foraging habitat includes emergent aquatic or streamside vegetation and vegetation within 100m of breeding habitat (DEC, 2005). Within the study area the River Oak riparian woodland vegetation community is likely to provide habitat for this species. Clearing of a small amount of this vegetation within the alignment is not considered to further fragment or isolate the already fragmented vegetation (and hence *Litoria subglandulosa* habitat) that occurs within the Project area. Given that *Litoria subglandulosa* has not been recorded historically throughout the Project area, the potential habitat within the Project area is not considered to be important to the long-term survival of the species.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, a recovery plan has been developed for *Litoria piperata*. No recovery or threat abatement plans have been developed for the remaining Hylidae frog species included in this assessment. In lieu of a formalised recovery plan, the DECCW has developed a number of priority actions and strategies to assist in the species recovery. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

Eleven priority action statements have been identified for *Litoria brevipalmata.* Key recovery actions include:

- Maintain vegetation and leaf litter around ponds, dams, drainage lines and other moist areas;
- Conserve natural patterns of local flooding; and
- Protect water bodies from pollution.

Four recovery strategies have been identified for *Litoria piperata*, as part of the *Yellow-spotted Bell Frog (Litoria castanea) and Peppered Tree Frog (Litoria piperata) recovery plan* (NSW National Parks and Wildlife Service, 2001). Key recovery actions include:

- Protection of potential habitat; and
- Protection of any extant populations identified.

Five priority action statements identified for *Litoria subglandulosa*. Key recovery actions include:

- Protect streams from pollution;
- Maintain vegetation and leaf litter around ponds, dams, drainage lines and other moist areas;
- Conserve natural local patterns of flooding; and
- Control weeds.

c) *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.*

The following key threatening processes (under the TSC Act) have been identified as being relevant to the species included within this assessment:

- Bushrock removal; several of these frog species are known to utilise bush rock as a habitat resource. Removal of such biotic elements may reduce local potential habitat.
- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these frog species.
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis; the movement of vehicles and workers close to and across waterways may result in the spread of the disease to local populations of frogs.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local cat populations and put greater predation pressure on local frog populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local fox populations and put greater predation pressure on local frog populations.
- Removal of dead wood and dead trees; some frog species shelter under fallen timber and leaves, therefore the removal of such habitat during the project could reduce potential habitat area within the study area east.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW National Parks and Wildlife Service (2001). Yellow-spotted Bell Frog (*Litoria castanea*) and Peppered Tree Frog (*Litoria piperata*) recovery plan. NPWS, Hurstville, NSW.

DEC (2005). Glandular Frog – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10493

DEC (2005). Green-thighed Frog – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10485

1.1.12 Koala (*Phascolarctos cinereus*)

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*

Phascolarctos cinereus (Vulnerable, TSC Act) has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range (DEC, 2005). This species was not detected during field surveys conducted within the Project area. However, there are numerous historical records of the species from within the Project area. Assuming mitigation measures are adopted, the Project is considered unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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*

Phascolarctos cinereus habitat includes eucalypt woodlands and forests. The species feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (DEC, 2005). The Project will require the removal and clearing of potential *Phascolarctos cinereus* habitat to make way for the required easement. This clearing may result in the isolation and fragmentation of potential habitat for the species. Given the large number of records within the locality, and the suitable habitat that occurs outside the Project area, and assuming mitigation measures are adopted, the habitat to be

removed is considered to be of low importance to the long term survival of the species in the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

An approved recovery plan has been developed for *Phascolarctos cinereus*; *Recovery plan for the koala (Phascolarctos cinereus)* (DECC, 2008). This plan outlines a number of recovery objectives as well as specific recovery actions relevant to the Project:

- Identify and conserve habitat important for koala conservation;
- Assess the impact of habitat loss and fragmentation on koala populations;
- Integrate koala habitat conservation into local and state government planning processes;
- Rehabilitate and restore koala habitat and populations; and
- Manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent and high standards of care.

Assuming mitigation measures are adopted, the Project is not inconsistent with the objectives of the recovery plan.

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

The following key threatening process relevant to *Phascolarctos cinereus* may be increased by the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which constitutes habitat for the species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Koala – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10616

DECC (2008). Recovery plan for the koala *(Phascolarctos cinereus)*. Approved Recovery Plan, November 2008. Department of Environment and Climate Change NSW. Viewed online 24/11/2010. http://www.environment.nsw.gov.au/resources/threatenedspecies/08450krp.pdf

1.1.13 Beccari's Freetail-bat (*Mormopterus beccarii*); Hairy-nosed Freetail Bat (*Mormopterus eleryi*) and Eastern Freetail-bat (*Mormopterus norfolkensis*)

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

Mormopterus beccarii (Vulnerable, TSC Act) is widely distributed across northern Australia from Western Australia to Queensland, extending south to the north-east corner of NSW. Records are patchy throughout northern NSW. This species was not recorded during field surveys conducted throughout the study area using echolocation detection survey techniques Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Mormopterus eleryi (*Endangered*, TSC Act) is found from the southern half of the Northern Territory to central Queensland and north-western NSW. In NSW, the species has been recently recorded from only three disjunct locations: thirteen individuals from Gundabooka National Park, south of Bourke; one individual from Dhinnia Dthinawan Nature Reserve (formerly Bebo State Forest), north of Warialda and two individuals from near Bonshaw. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Mormopterus norfolkensis (Vulnerable, TSC Act) is found along the east coast from south Queensland to southern NSW. This species was not recorded during field surveys conducted throughout the study area using echolocation detection survey techniques. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. 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

2. 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

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Mormopterus beccarii occurs in a range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. The species roosts mainly in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland. The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Mormopterus eleryi is distributed from the southern half of the Northern Territory to central Queensland and north-western NSW. The species is extremely rare throughout its range, having been identified in only 15 locations nationally. Knowledge of the ecology of the species is limited; however evidence suggests that the species depends on tree hollows and fissures for roosting sites. The Project will require the clearing of vegetation that may constitute potential *Mormopterus eleryi* habitat. DEC (2005) identifies that the threat to *Mormopterus eleryi* from loss of habitat is exacerbated by its apparent low numbers. For these reasons, the clearing of land has the potential to fragment important local habitat of *Mormopterus eleryi,* and so threaten the long term survival of the species in the locality.

Mormopterus norfolkensis is distributed along the east coast of Australia, from southern Queensland to southern NSW. The species occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. *Mormopterus norfolkensis* roosts mainly in tree hollows or under bark. The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Mormopterus beccarii.* In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Reduce the frequency of burning forests and woodlands in areas of known habitat, particularly forests used for cattle grazing;
- Reduce the use of pesticides and consider the use of alternatives where available;
- Protect hollow-bearing trees, including those in agricultural and urbanised areas, and ensure a range of tree age classes are present in known habitat to sustain a supply of hollow-bearing trees; and
- Protect known and potential habitat from clearing.

To date, no formal recovery plan has been developed for *Mormopterus eleryi*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Protect hollow bearing live and dead trees within the species' range;
- Discourage pesticide drift near species' habitat;
- Develop burning strategies that reduce impacts on preferred habitat in known foraging areas; and
- Report any sightings of the species to the NSW Department of Environment and Conservation.

To date, no formal recovery plan has been developed for *Mormopterus norfolkensis*. In lieu of a recovery plan, DEC (2005) has developed a series of recovery strategies for the species, relevant to the Project:

- Retain hollow-bearing trees and provide for hollow tree recruitment;
- Retain foraging habitat; and
- Minimise the use of pesticides in foraging areas.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The Project may result in an increase to the following key threatening processes, which are considered relevant to all species included within this assessment:

- Clearing of native vegetation; the Project will require clearing of native vegetation, some of which constitutes potential roosting and/or foraging habitat for the species included within this assessment. Hollow bearing trees are a key habitat resource for these species, providing important roost and shelter habitats. The Project will result in the removal of and disturbance to some hollow bearing trees from within the Project area.
- Removal of dead wood and dead trees; dead wood, trees and coarse woody debris is potential habitat for the species within the area of assessment. The Project will result in the reduction of dead wood and trees from within the easement, which will in turn reduce potential habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aims to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.14 Muridae - Eastern Chestnut Mouse (*Pseudomys gracilicaudatus*) and Hastings River Mouse (*Pseudomys oralis*)

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

Pseudomys gracilicaudatus (Vulnerable) mainly occurs north from the Hawkesbury River area as scattered records along to coast and eastern fall of the Great Dividing Range extending north into Queensland (DEC, 2005). The species is predicted to occur within the Project area east due to the presence of suitable habitat. The Project will require clearing of potential habitat for this species. However, assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Pseudomys oralis (Endangered, TSC Act; Endangered, EPBC Act) has a patchy distribution spanning the Great Dividing Range from the Hunter Valley, north to the Bunya Mountains near Kingaroy in south-east Queensland, at elevations between 300m and 1100m (DEC, 2005). This species is predicted to occur within the study area east, just east of Tenterfield, based on historical records and the presence of suitable habitat. The Project will require clearing of potential habitat for this species. However, assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Pseudomys gracilicaudatus is mostly found in heath and is most common in dense, wet heath and swamps. The Project will result in the clearing of potential habitat for this species. This clearing will also result in some fragmentation of vegetation throughout the Project area. Given

the existing fragmentation and assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

Pseudomys oralis are found in a variety of dry open forest types with dense, low ground cover and a diverse mixture of ferns, grass, sedges and herbs. Access to seepage zones, creeks and gullies is important, as is permanent shelter such as rocky outcrops. Nests may be in either gully areas or ridges and slopes. The Project will result in the clearing of potential habitat for this species. This clearing will also result in some fragmentation of vegetation throughout the Project area. Given the existing fragmentation and assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Pseudomys gracilicaudatus*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Undertake fox and feral cat and dog control program targeting areas of known or high quality potential habitat;
- Control feral pigs;
- Apply mosaic pattern hazard burns to ensure that a range of age stands of heath is available to each population of Eastern Chestnut Mouse; and
- All vegetation within 200 m of heaths and swamps supporting the species should be retained and not disturbed.

A recovery plan has been developed for *Pseudomys oralis*; *Recovery Plan for the Hastings River Mouse (Pseudomys oralis)* (NSW Department of Environment and Conservation, 2005). The plan lists a series of recovery objectives and actions aimed at recovering the species in NSW. The following are relevant to the Project:

- Identify new *Pseudomys oralis* populations, particularly in areas with natural refuges and secure tenure; and
- Ensure that *Pseudomys oralis* populations and habitats are identified and managed to minimise impact from developments and activities.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The Project may result in an increase to the following key threatening process relevant to *Pseudomys gracilicaudatus and Pseudomys oralis*:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which constitutes habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.15 Myobatrachidae – Ground Frogs: Stuttering Frog (*Mixophyes balbus*); Giant Barred Frog (*Mixophyes iteratus*); Loveridge's Frog (*Philoria loveridgei*); *Philoria pughi*; and *Philoria richmondensis*.

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

Mixophyes balbus is known to occur within the Cataract, Stanthorpe and Rocky River Gorge sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area. However, this species is known to occur within Girard State Forest, approximately 6 km from the proposed Alignment and easement. This distance is considered a sufficient buffer from any direct Project impacts including all pre-construction, construction and post-construction activities. Environmental pressures from actions occurring in the Project area including vegetation clearing are unlikely to contribute to the extinction of any viable local populations.

Mixophyes iteratus is known to occur within the Cataract, Woodenbong, Clarence Lowlands, Clarence Sandstone and Rocky River Gorge sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area. However, this species is known to occur within Girard State Forest, approximately 5 km from the proposed Alignment and easement. This distance is considered a sufficient buffer from any direct Project impacts including all pre-construction, construction and post-construction activities. Environmental pressures from actions occurring in the Project area including vegetation clearing are unlikely to contribute to the extinction of any viable local populations.

Philoria loveridgei is known to occur in both the Richmond – Tweed and Woodenbong sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area. This species has not been recorded historically within the Project area. This frog is dependent on high moisture levels, occurring in the headwaters of small streams for breeding and nesting. No small streams of this type occur directly within the area of impact for the project. As such this Project is unlikely to contribute to the extinction of any viable local populations.

Philoria pughi is known to occur in the Rocky River Gorge and Cataract sub-regions of the Northern Rivers CMA. This species is known to occur within Girard State Forest in close proximity to the Alignment and easement; however no individuals of this species were observed during field surveys conducted throughout the study area. This species is likely to use rock outcrops or cliff bases that hold surface moisture in wet eucalypt forests for breeding and nesting. No such habitat occurs within the Project area. Environmental pressures from actions occurring in the Project area including vegetation clearing are therefore unlikely to contribute to the extinction of any viable local populations.

Philoria richmondensis is known to occur in the Woodenbong sub-region of the Northern Rivers CMA. No individuals of this species were observed during field surveys conducted throughout the study area, nor has this species been recorded historically within the Project area. This frog is usually only found in burrows in upper tributaries or along streams in highland areas. No such habitat occurs within the area of impact for the Project. As such the Project is unlikely to contribute to the extinction any viable local populations.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Mixophyes balbus is found in rainforest, Antarctic Beech and wet sclerophyll forests. The species depends on freshwater streams and riparian vegetation for breeding and habitation (NSW Scientific Committee, 2002). These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Mixophyes balbus* habitat, is not considered likely to further fragment or isolate the species.

Mixophyes iteratus is associated with permanent flowing drainages, from shallow rocky rainforest streams to slow moving rivers in lowland open forest. It is not restricted to particular vegetation forms, utilising rainforest, and to a lesser degree wet sclerophyll forest and cleared land (NSW Scientific Committee, 1999). These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with

Mixophyes iteratus habitat, is not considered likely to further fragment or isolate the species, given the presence of the existing 132kV easement.

Philoria loveridgei is found in boggy upper tributaries of streams and soaks in Antarctic Beech forests, rainforests and wet sclerophyll forests above altitudes of approximately 550m (NSW Scientific Committee, 2005). *Philoria loveridgei* is considered to be a habitat specialist typically associated with mountain streams. The clearing of vegetation, some of which is consistent with *Philoria loveridgei* habitat, is not considered likely to further fragment or isolate the species.

Philoria pughi is a habitat specialist associated with mountain streams. It inhabits boggy upper tributaries of streams and soaks in Antarctic Beech forests, rainforests and wet sclerophyll forests above altitudes of approximately 550m (NSW Scientific Committee, 2005). The clearing of vegetation, some of which is consistent with *Philoria pughi* habitat, is not considered likely to further fragment or isolate the species.

Philoria richmondensis is associated with mountain streams. *Philoria richmondensis* inhabits boggy upper tributaries of streams and soaks in Antarctic Beech forests, rainforests and wet sclerophyll forests above altitudes of approximately 550m (NSW Scientific Committee, 2005). The clearing of vegetation, some of which is consistent with *Philoria richmondensis* habitat, is not considered likely to further fragment or isolate the species.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

A draft recovery plan (currently on public exhibition) has been developed for *Mixophyes balbus*; *National Recovery Plan for the Stuttering Frog Mixophyes balbus* (Hunter and Gillespie, 2010). This plan outlines three recovery objectives and fifteen recovery actions for the species, of which the following are relevant to the Project:

- Implement effective hygiene protocols;
- Incorporate markers for site recognition; and
- Promote public education and awareness.

To date, no recovery or threat abatement plans have been developed for any of the other Myobatrachidae frog species included in this assessment. In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the species recovery. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

Five priority action statements have been identified for *Mixophyes iteratus*, those relevant to the Project include:

- Maintain vegetation and deep leaf-litter around streams; and
- Manage upstream developments to minimise changes in water quality and flow.

Four priority action statements have been identified for *Philoria loveridgei*, those relevant to the Project include:

- Protect known and potential habitat from activities that reduce moisture levels;
- Maintain vegetation and deep leaf-litter around streams; and

- Adopt the DEC frog hygiene protocol to prevent the spread of chytrid fungus in amphibian habitat.

Two priority action statements have been identified for *Philoria pughi*, those relevant to the Project include:

- Protect areas of known habitat from roading, logging and other disturbance; and
- Adopt the DEC frog hygiene protocol to prevent the spread of chytrid fungus in amphibian habitat.

Two priority action statements have been identified for *Philoria richmondensis*, those relevant to the Project include:

- Protection of areas of known habitat from roading, logging and other disturbance; and
- Adoption of the DEC frog hygiene protocol to prevent the spread of chytrid fungus in amphibian habitat.

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.

The following key threatening processes (under the TSC Act) have been identified as being relevant to the species included within this assessment:

- Bushrock removal; several of these frog species are known to utilise bush rock as a habitat resource. Removal of such biotic elements may reduce local potential habitat.
- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these frog species.
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis; the movement of vehicles and workers close to and across waterways may result in the spread of the disease to local populations of frogs.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local cat populations and put greater predation pressure on local frog populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local fox populations and put greater predation pressure on local frog populations.
- Removal of dead wood and dead trees; some frog species shelter under fallen timber and leaves, therefore the removal of such habitat during the project could reduce potential habitat area within the study area east.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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http://www.environment.nsw.gov.au/determinations/PhiloriaPughiEndSpListing.htm

NSW Scientific Committee (2005). Final determination. *Philoria richmondensis* (a frog) - endangered species listing. Viewed online 11/11/2010.
http://www.environment.nsw.gov.au/determinations/PhiloriaRichmondensisEndSpListing.htm

1.1.16 Owls: Barking Owl (*Ninox connivens*); Powerful Owl (*Ninox strenua*); Grass Owl (*Tyto capensis*); Masked Owl (*Tyto novaehollandiae*); and Sooty Owl (*Tyto tenebricosa*).

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*

Ninox connivens is known and predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA (respectively), and known or predicted to occur in the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. *Ninox connivens* is found throughout continental Australia except for the central arid regions. The species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ninox strenua known within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA, and known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Tyto capensis. Within the Northern Rivers CMA, this species is known to occur within the Clarence Lowlands and Richmond - Tweed subregions, and is predicted to occur within the Clarence Sandstones sub-region. In NSW they are more likely to be resident in the north-east. No individuals of this species were observed during field surveys of the study area. Given the

mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Tyto novaehollandiae is predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA and is known to occur within the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. This species extends from the coast where it is most abundant to the western plains. No individuals of this species were observed during URS field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Tyto tenebricosa is known to occupy the following Northern Rivers CMA sub-regions; Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau, and Woodenbong. This species occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. No individuals of this species were observed during URS field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Ninox connivens inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Is flexible in its habitat use and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW). These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Ninox connivens* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Ninox strenua occupies a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Ninox strenua* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Tyto capensis occurs in areas of tall grass including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Tyto capensis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Tyto novaehollandiae inhabits dry eucalypt forests and woodlands from sea level to 1100 m elevation. Some of these habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Tyto novaehollandiae* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Tyto tenebricosa occurs within rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Some of these habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Tyto tenebricosa* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Ninox connivens or Tyto capensis.* A Recovery Plan has been prepared for the Large Forest Owls: Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*) (DEC, 2006).

In lieu of a formalised recovery plan for *Ninox connivens*, DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Retain standing dead trees and large fallen logs;
- Protect woodland and open forest remnants, especially those containing hollow-bearing trees; and
- Retain and enhance vegetation along watercourses and surrounding areas to protect important habitat of the owls and their prey.

In lieu of a formalised recovery plan for *Tyto capensis*, DECCW has developed a number of priority actions and strategies to assist species recovery. The two key recovery strategies relevant to the proposed development include:

- Reduce the use of pesticides where Grass Owls are known to be present; and
- Identify, retain and protect areas of suitable habitat.

Recovery actions outlined for the large forest owls: *Ninox strenua*, *Tyto tenebricosa* and *Tyto novaehollandiae* include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Specific recovery actions identified for these three species include:

- Reducing the use of pesticides;
- Identify, retain and protect areas of suitable habitat;
- Retain at least a 200 metre buffer of native vegetation around known nesting sites;
- Retain large stands of native vegetation, especially those containing hollow-bearing trees; and
- Protect riparian vegetation to preserve roosting areas. Protect hollow-bearing trees for nest sites. Younger recruitment trees should also be retained to replace older trees in the long-term.

For all owls assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the owl species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, hunting and shelter habitat for all of these owl species. Vegetation clearing practices that remove old, hollow-bearing trees and change open forest structure to dense regrowth are particular threats.
- Removal of dead wood and dead trees; this is identified as a key threat for owl species which reply on stags and hollow bearing trees (including dead trees) for nesting habitat. Retaining dead timber and stags is listed as a key recovery measure for these species.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.17 Parrots: Little Lorikeet (*Glossopsitta pusilla*); Swift Parrot (*Lathamus discolor*); and Turquoise Parrot (*Neophema pulchella*).

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

Glossopsitta pusilla is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA, as well as the Clarence Lowlands, Clarence Sandstones, Cataract, Richmond - Tweed, Stanthorpe Plateau, Rocky River Gorge and Woodenbong sub-regions of the Northern Rivers CMA. This species was recorded during URS surveys. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Lathamus discolour is predicted to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA, and known in the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Stanthorpe Plateau sub-regions of the Northern Rivers CMA. In NSW, the species mostly occurs on the coast and south west slopes. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Neophema pulchella is known within the Nandewar, Northern Complex, sub-region of the Border Rivers/Gwydir CMA, and the Clarence Lowlands, Clarence Sandstones and Stanthorpe Plateau sub-regions of the Northern Rivers CMA. Its range extends from southern

Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. This species was observed during field surveys by URS. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Glossopsitta pusilla forages primarily in the canopy of open Eucalyptus forest and woodland, and also find food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used by this species. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Glossopsitta pusilla* habitat is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Lathamus discolour occur in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Lathamus discolour* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Neophema pulchella lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. These habitats are typical of some of the bushland found within the study area. Clearing vegetation, some of which is consistent with *Neophema pulchella* is not considered likely to further fragment or isolate the species, given the existing 132kV

easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Glossopsitta pusilla*, *Lathamus discolour or Neophema pulchella.* As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan for *Glossopsitta pusilla*, DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Retain large old trees, especially those that are hollow-bearing;
- Ensure recruitment of trees into the mature age class so that there is not a lag period of decades between the death of old trees and hollow formation in younger trees;
- Protect large flowering *Eucalyptus* trees throughout the habitats frequented by this species; and
- Manage remnant woodlands and forest for recovery of old-growth characteristics.

In lieu of a formalised recovery plan for *Lathamus discolour*, DECCW has developed a number of priority actions and strategies to assist species recovery. No recovery strategies listed for this species by DECCW is relevant to the proposed development.

In lieu of a formalised recovery plan for *Neophema pulchella*, DECCW has developed a number of priority actions and strategies to assist species recovery. The three key recovery strategies relevant to the proposed development include:

- Undertake fox and feral cat control programs in key habitat areas.;
- Retain areas of open woodland with grassy under-storey and adjoining grassland; and
- Protect hollow-bearing trees for nest sites. Younger mature trees should also be retained to provide replacements for the older trees when they eventually die and fall over.

For all parrots assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the parrot species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these parrot species. Small scale clearing, such as during roadworks and fence construction continues to destroy habitat and it will be decades before revegetated areas supply adequate forage sites. The loss of old hollow-bearing trees has reduced nest sites, and increased competition with other native and exotic species that need large hollows with small entrances to avoid predation.

- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local cat populations and put greater predation pressure on *Neophema pulchella* populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement across alignment east may increase potential hunting grounds for local fox populations and put greater predation pressure on local *Neophema pulchella* populations.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.18 Petauridae and Burramyoidae – Eastern Pygmy-possum (*Cercartetus nanus*); Yellow-bellied Glider (*Petaurus australis*) and Squirrel Glider (*Petaurus norfolcensis*)

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

Cercartetus nanus (Vulnerable, TSC Act) is found in south east Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extents from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes (DEC, 2005). This species was not observed during field surveys conducted in the study area, nor are there historical records within the Project area. As such, it is unlikely that the Project would have an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Petaurus australis (Vulnerable, TSC Act) is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. This species was not observed during field surveys conducted within the study area. However, there are numerous historical records of the species throughout the locality. Assuming mitigation measures are adopted, it is unlikely that the Project would have an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Petaurus norfolcensis (Vulnerable, TSC Act) is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. This species was not observed

during field surveys conducted within the study area. However, there are numerous historical records of the species throughout the locality. Assuming mitigation measures are adopted, it is unlikely that the Project would have an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Cercartetus nanus are found in a broad range of habitats from rainforest to sclerophyll forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation (e.g. grass-tree skirts). Tree hollows are favoured as nesting sites. The Project will result in the clearing of potential habitat for this species. This clearing will also result in some fragmentation of vegetation throughout the Project area. However, given the presence of the existing 132kV easement, this fragmentation is not considered to be significant. Given the existing fragmentation and assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

Petaurus australis occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. The species rely on large tree hollows for den sites. The species is very mobile and occupy large home ranges of between 20 and 85 ha to encompass dispersed and seasonally variable food resources. The Project will result in the clearing of potential habitat for this species. This clearing will also result in some fragmentation of vegetation throughout the Project area, however given the presence of the existing 132kV easement, and the mobile nature of the species, this fragmentation is not considered to be significant. Given the existing fragmentation and assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

Petaurus norfolcensis inhabit mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. The species prefers mixed species stands with a shrub or *Acacia* midstory, and require abundant tree hollows for refuge and nest sites (DEC, 2005). The Project will result in the clearing of potential habitat for this species. This clearing will also result in some fragmentation of vegetation throughout the Project area. However, given the presence of the existing 132kV easement, this fragmentation is not considered to be significant. Given the existing fragmentation and assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Cercartetus nanus*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Control feral predators and rabbits;
- Avoid frequent burning of habitat; and
- Protect habitat in proposed development areas and retain linkages across the broader landscape.

A recovery plan has been developed for *Petaurus australis*; *Recovery Plan for the Yellow-bellied Glider (Petaurus australis)* (NSW National Parks and Wildlife Service, 2003). The plan lists a series of recovery objectives and actions aimed at recovering the species in NSW. The following are relevant to the Project:

- Identify and monitor significant populations of the species; and
- Encourage and assist in improving the protection and management of *Petaurus australis* and its habitat.

To date, no formal recovery plan has been developed for *Petaurus norfolcensis*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Retain den trees and recruitment trees (future hollow-bearing trees);
- Retain food resources, particularly sap-feeding trees and understorey feed species such as Acacias and Banksias;
- Replace top one or two strands of barbed wire on fences with regular wire in and adjacent to habitat;
- Retain and protect areas of habitat, particularly mature or old growth forest containing hollow-bearing trees and sap-feeding trees; and
- In urban and rural areas retain and rehabilitate habitat to maintain or increase the total area of habitat available, reduce edge effects, minimise foraging distances and increase the types of resources available.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The Project may result in an increase to the following key threatening process relevant to *Cercartetus nanus*, *Petaurus australis* and *Petaurus norfolcensis*:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which constitutes habitat for these species.
- Loss of hollow-bearing trees; the Project will require the clearing of hollow bearing trees, which may constitute habitat for these species.
- Removal of dead wood and dead trees; the Project will require the clearing of dead wood and dead trees, some of which may constitute habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Eastern Pygmy-possum – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10155

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1.1.19 Pteropodidae - Eastern Tube-nosed Bat (*Nyctimene robinsoni*); Grey-headed Flying-fox (*Pteropus poliocephalus*) and Common Blossom-bat (*Syconycteris australis*)

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

Nyctimene robinsoni (Vulnerable, TSC Act) occurs from north east Australia from Cape York south to the far north-east corner of NSW. There are few records from NSW, including the Nightcap, Tweed and Burringbar Ranges and Mt Warning. This species was not observed during field surveys conducted of the study area. However. there are historical records from Richmond Range National Park to the north of the Project area. Given the species' mobile nature and assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Pteropus poliocephalus (Vulnerable, TSC Act; Vulnerable, EPBC Act) occur within 200km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. There are historical records of this species from within the Project area, and the species was observed in the region (but outside of the study area and the Project area) during ecology field surveys. Given the species mobile nature and assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Syconycteris australis (Vulnerable, TSC Act) are distributed from coastal areas of eastern Australia from Hawks Nest in NSW to Cape York Peninsula in Queensland. The species also occurs in adjacent inland ranges in rainforest patches. The species was not observed during field surveys conducted of the study area. There are no historical records of the species within the Project area. Given the species mobile nature and assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Nyctimene robinsoni favour streamside habitats within coastal subtropical rainforest and moist eucalypt forests with a well-developed rainforest understorey. They feed mainly on fruit and nectar from trees in the rainforest canopy and may come close to human settlement to visit flowering or fruiting trees (DEC, 2005). The Project will result in the clearing of potential habitat for this species, within the alignment east. Given the species mobile nature, it is considered unlikely that this clearing will represent significant habitat fragmentation. Assuming mitigation measures are adopted, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

Pteropus poliocephalus are found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. The species may travel up to 50km each night to feed (DEC, 2005). The Project will result in clearing of potential foraging habitat for this species. Given the species mobile nature, this is not considered likely to result in significant fragmentation of habitat. Assuming mitigation measures are adopted, and given the species ability to travel large distances to forage, the

habitat that will be removed is considered to be of low importance to the survival of the species in the locality.

Syconycteris australis often roost in littoral rainforest and feed on nectar and pollen from flowers in adjacent heath and paperbark swamps. They have also been recorded in a range of subtropical forest types, rainforest, wet sclerophyll forest and coastal Eucalypt forest. They generally roost individually in dense foliage and vine thickets of the sub-canopy, staying in the same general area for a season. They change roost sites daily, but each roost site is generally only 50m or so away from other recent roosts (DEC, 2005). The Project will result in the clearing of potential habitat for this species within the alignment east. Given the species' mobile nature, it is considered unlikely that this clearing will represent significant habitat fragmentation. Assuming mitigation measures are adopted, and given the lack of records of *Syconycteris australis* within the Project area, the habitat to be removed is considered to be of low importance to the long term survival of the species in the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for the species included in this assessment. In lieu of a formal recovery plan, DEC (2005) has developed a series of recovery actions for each species.

The recovery actions for *Nyctimene robinsoni* relevant to the Project are:

- Control and remove introduced weeds at known locations; and
- Protect and rehabilitate areas of rainforest and wet eucalypt forest, particularly rainforest along streams.

The recovery actions for *Pteropus poliocephalus* relevant to the Project are:

- Protect roost sites, particularly avoid disturbance September through November;
- Identify and protect key foraging areas; and
- Identify powerline blackspots and implement measures to reduce deaths.

The recovery actions for *Syconycteris australis* relevant to the Project are:

- Protect areas of littoral rainforest, coastal heath and paperbark swamp; and
- Initiate and support rainforest and heath regeneration projects.

Mitigation measures are recommended to minimise the impact of the Project on each of these species.

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

The following key threatening process relevant to *Nyctimene robinsoni, Pteropus poliocephalus* and *Syconycteris australis* may be increased by the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which constitutes habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Eastern Tube-nosed Bat – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10566

DEC (2005). Grey-headed Flying-fox – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10697

DEC (2005). Common Blossom-bat – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10785

1.1.20 Rainforest birds: Coxen's Fig-Parrot (*Cyclopsitta diophthalma coxeni*); Wompoo Fruit-Dove (*Ptilinopus magnificus*); Rose-crowned Fruit-Dove (*Ptilinopus regina);* and Superb Fruit-Dove (*Ptilinopus superbus)*.

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*

Cyclopsitta diophthalma coxeni. Within the Northern Rivers CMA, it is known and predicted to occur within the Richmond - Tweed subregions (Part A and B respectively) and known in the Woodenbong sub-region. The species is believed to be limited to about five populations scattered between Bundaberg in Queensland and the Hastings River in NSW. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ptilinopus magnificus is known to occur within the following Northern Rivers CMA sub-regions: Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. It occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ptilinopus regina is known to occur within the Cataract, Clarence Lowlands, Richmond - Tweed, Stanthorpe Plateau, Woodenbong sub-regions of the Northern Rivers CMA, as well as being predicted to occur within the Rocky River Gorge sub-region. This species occurs along the coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ptilinopus superbus is known within the Northern Rivers CMA occurring within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions, and predicted to occur within the Clarence Sandstones sub-region. The species occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. No individuals of this species were observed during field surveys of the study area. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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*

Cyclopsitta diophthalma coxeni is usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. The species is also found in the wetter lowland rainforests that are now largely cleared in NSW. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Cyclopsitta diophthalma coxeni* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Ptilinopus magnificus occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Ptilinopus magnificus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Ptilinopus regina occurs mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation,, some of which is consistent with *Ptilinopus regina* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Ptilinopus superbus is known within the Northern Rivers CMA - within the Clarence Lowlands, Richmond - Tweed and Woodenbong sub-regions. The species is predicted to occur within the Clarence Sandstones sub-region. This species inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Ptilinopus superbus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for *Ptilinopus magnificus, Ptilinopus regina* or *Ptilinopus superbus.* A Recovery Plan has been prepared for *Cyclopsitta diophthalma coxeni* (NPWS 2002).

In lieu of a formalised recovery plan for *Ptilinopus magnificus*, DECCW has developed a number of priority actions and strategies to assist species recovery. The four key recovery strategies relevant to the proposed development include:

- Retain forested corridors that link east to west migration routes;
- Encourage and initiate weed control programs;
- Protect known and potential food trees; and
- Protect rainforest and moist forest habitat.

In lieu of a formalised recovery plan for *Ptilinopus regina*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The four key recovery strategies relevant to the proposed development include:

- Retain forested corridors that link north-south and east-west migration routes;
- Encourage and initiate weed control programs;
- Protect remnant stands of rainforest and moist forest from clearing or development; and
- Protect known and potential food trees.

In lieu of a formalised recovery plan for *Ptilinopus superbus*, the DECCW has developed a number of priority actions and strategies to assist species recovery. The main recovery strategy relevant to the proposed development is:

- Retain and protect rainforest remnants.

A Recovery Plan has been prepared for *Cyclopsitta diophthalma coxeni* (NPWS 2002). It outlines a range of long term and immediate objectives for this species. These include the

maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. The main recovery action of relevance to the project outlined for *Cyclopsitta diophthalma coxeni* is:

- Retain and protect areas of rainforest and adjoining wet eucalypt forest.

For all rainforest birds assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the rainforest bird species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for all of these honeyeater bird species. Removing important feed trees (figs and other trees classified as rainforest species in particular) would limit the food resources available for these species. Vegetation clearing and increasing habitat fragmentation and dissection of habitat corridors is a threat to these species.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW National Parks and Wildlife Service (2002) Double-eyed Fig Parrot Recovery Plan. NSW NPWS, Hurstville NSW. Viewed online 19/11/2010.
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DECCW, (2010). Threatened Species Profile. Wompoo Fruit-dove – profile. Viewed online 19/11/2010.
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DECCW, (2010). Threatened Species Profile. Rose-crowned Fruit-dove - profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10708

DECCW, (2010). Threatened Species Profile. Superb Fruit-dove – profile. Viewed online 19/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10709

1.1.21 White-crowned Snake (*Cacophis harriettae*); Three-toed Snake-tooth Skink (*Coeranoscincus reticulatus*); Pale-headed Snake (*Hoplocephalus bitorquatus*); Stephens' Banded Snake (*Hoplocephalus stephensii*) and Border Thick-tailed Gecko (*Underwoodisaurus sphyrurus*).

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*

Cacophis harriettae (Vulnerable, TSC Act) is known from the Northern Rivers CMA. Several historical records of this species exist within the study area east. *Cacophis harriettae* preys upon smaller reptiles, within a range of habitats (DEC, 2005). The Project may result in the disturbance to potential habitat for this species, however assuming mitigation measures are adopted it is considered unlikely that the Project would have an adverse effect on the lifecycle of the species such that a viable local population is placed at risk of extinction.

Coeranoscincus reticulatus (Vulnerable, TSC Act; Vulnerable, EPBC Act) is infrequently observed due to its burrowing habits. The species is known from the Northern Rivers CMA (DEC, 2005). This species could be predicted to occur within the study area east, based on habitats present. Assuming adoption of mitigation measures, the Project is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population is placed at risk of extinction.

Hoplocephalus bitorquatus (Vulnerable, TSC Act) occurs from south east Queensland to north east NSW. The species occurs in a range of habitats, but prefers stream side locations (DEC, 2005). This species is predicted to occur within the Project area, based on habitats present. Provided mitigation measures are adopted, and given the lack of historical records within the Project area, it is considered unlikely that the Project would have an adverse effect on the lifecycle of the species such that a viable local population is placed at risk of extinction.

Hoplocephalus stephensii (Vulnerable, TSC Act; Vulnerable, EPBC Act) occurs from Gosford in NSW to southern Queensland (DEC, 2005). Numerous historical records of this species exist within the study area. Assuming adoption of mitigation measures, the Project is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population is placed at risk of extinction.

Underwoodisaurus sphyrurus (Vulnerable, TSC Act; Vulnerable, EPBC Act) is most commonly recorded in the granite country of the New England Tablelands. Historical records of this species exist in the study area west. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Cacophis harriettae occurs in dry eucalypt forest and woodland, particularly areas with a varied and well-developed litter layer, where small lizards are abundant. The species is also occasionally found in moist eucalypt forest and coastal heathland. The Project will require the clearing of potential *Cacophis harriettae* habitat in the form of vegetation clearing and potential movement of rock matter. Given the existing 132kV easement within the Project area east, it is considered unlikely that the Project would result in significant additional fragmentation of habitat for this species. Given the existing easement, the habitat to be removed is also considered to be of low importance to the long-term survival of the species within the locality.

Coeranoscincus reticulatus prefers rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. The species lives in loose soil, leaf litter and rotting logs, feeding on invertebrates. *Coeranoscincus reticulatus* is predicted to occur within the Project area east, based on habitats present. Given the existing 132kV easement, it is considered unlikely that the Project would result in additional significant fragmentation or removal of habitat that is important to the long-term survival of the species within the locality.

Hoplocephalus bitorquatus is found in dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. The species favours streamside areas, particularly in drier habitats. The Project has the potential to impact upon land that may be considered potential *Hoplocephalus bitorquatus* habitat. Assuming mitigation measures are adopted, the Project is considered unlikely to result in additional significant fragmentation or removal of habitat that is important to the long-term survival of the species within the locality.

Hoplocephalus stephensii occurs in rainforest and eucalypt forests and rocky areas up to 950m in altitude. The Project has the potential to remove habitat that may be used by this species. Assuming mitigation measures are adopted, the Project is considered unlikely to result in additional significant fragmentation or removal of habitat that is important to the long-term survival of the species within the locality.

Underwoodisaurus sphyrurus lives on steep rocky or scree slopes. The species prefers forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. The Project may result in disturbance to potential habitat for this species. Assuming mitigation measures are adopted, the Project is considered unlikely to result in additional significant fragmentation or removal of habitat that is important to the long-term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No formal recovery plan has been developed for the reptile species included within this assessment.

In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for *Cacophis harriettae*, of which the following are relevant to the Project:

- Do not collect fallen timber for firewood or bush rock for gardens from bushland areas; and
- Protect known and potential habitat from clearing, fragmentation and isolation.

In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for *Coeranoscincus reticulatus*, of which the following are relevant to the Project:

- Retain and protect areas of rainforest and moist eucalypt forest; and
- Control pigs when they occur within potential habitat for this species

In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for *Hoplocephalus bitorquatus*, of which the following are relevant to the Project:

- Retain hollow-bearing trees as well as large, mature trees;
- Retain and protect stands of native vegetation, especially those with old and dead trees and along creeklines; and
- Establish and protect forested wildlife corridors.

In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for *Hoplocephalus stephensii*, of which the following are relevant to the Project:

- Retain and protect stands of native vegetation, especially those with old and dead trees; and
- Retain hollow bearing trees as well as large, mature trees.

In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for *Underwoodisaurus sphyrurus*, of which the following are relevant to the Project:

- Retain bushrock in its natural setting and obtain rocks for gardens only from licensed dealers;
- Assist with the control of foxes, feral cats and feral goats; and
- Retain and protect areas of rocky dry open forest and woodland from clearing, fragmentation and disturbance.

Assuming the adoption of mitigation measures, and the lack of formal recovery plans for any of the reptile species included within this assessment, the Project is not considered to be inconsistent with the recovery of these species.

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

The following key threatening processes (KTPs) are relevant to the species included within this assessment:

- Bushrock removal; the Project may require the removal of bushrock from within potential habitat for each of these species.
- Clearing of native vegetation; the Project will require vegetation clearing along the entire Alignment. The vegetation to be cleared may constitute habitat for these species.
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition; the reptile species included within this assessment are all threatened by inappropriate fire regimes. It is considered unlikely that the Project would result in significant changes to the current fire regime.

- Predation by the European red fox (*Vulpes vulpes*); *Vulpes vulpes* poses a risk to the reptile species in this assessment. *Vulpes vulpes* were observed throughout the Project area, so it is considered unlikely that the Project would result in an increase to this KTP.
- Predation by the feral cat (*Felis catus*); *Felis catus* poses a risk to the reptile species in this assessment. *Felis catus* were observed throughout the Project area, so it is considered unlikely that the Project would result in an increase to this KTP.
- Removal of dead wood and dead trees; the reptiles species included in this easement rely upon dead wood, dead trees and bark as a habitat resource. The Project may require the removal of some dead wood, course woody debris and dead trees from within the Project area.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). White-crowned Snake - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10117

DEC (2005). Border Thick-tailed Gecko - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10823

DEC (2005). Three-toed Snake-tooth Skink – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10172

DEC (2005). Pale-headed Snake - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10412

DEC (2005). Stephen's Banded Snake - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10414

1.1.22 Robins: Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*); Scarlet Robin (*Petroica boodang*); and Flame Robin (*Petroica phoenicea)*.

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

Melanodryas cucullata cucullata is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is also known within the Cataract, Clarence Lowlands, Clarence Sandstones, Stanthorpe Plateau sub-regions of the Northern Rivers CMA, and predicted to occur within the Rocky River Gorge sub-region. No individuals of this species were observed during URS field surveys. The closest record of this species is from approximately 35km to the south of Casino. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Petroica boodang is predicted to occur within the Nandewar, Northern Complex, and known within the Tenterfield Plateau sub-region of the Border Rivers/Gwydir CMA. It is also known within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys of the area. There are recent records of this species across study area west and east. The species has been recorded in close proximity to Dumaresq substation and around Bald Rock National Park near Tenterfield. There are also records within Basket Swamp National Park and Timbarra National Park near Black Swamp, and Richmond Range National Park near Kyogle. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Petroica phoenicea is known to occur within the Nandewar, Northern Complex and Tenterfield Plateau sub-regions of the Border Rivers/Gwydir CMA. It is known or predicted to occur within the Cataract, Clarence Lowlands, Clarence Sandstones, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong sub-regions of the Northern Rivers CMA. No individuals of this species were observed during field surveys of the area. The closest record of this species is from the Malara State Forest approximately 15km to the south of the proposed Alignment (study area east). Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Melanodryas cucullata cucullata are found in lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee communities; often in, or near clearings or open areas. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Melanodryas cucullata cucullata* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Petroica boodang are found in dry eucalypt forests and woodlands. They usually occur where the understorey is open and grassy with few scattered shrubs. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Petroica boodang* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Petroica phoenicea occurs in upland moist eucalypt forests and woodlands, often on ridges and slopes in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. The clearing of vegetation, some of which is consistent with *Petroica phoenicea* habitat is not considered likely to further fragment or isolate the species, given the existing 132kV easement across Alignment East, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the Robins considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist *Melanodryas cucullata cucullata, Petroica boodang* and *Petroica phoenicea* species recovery. The key recovery strategies relevant to the Project are common across these robin species and out detailed below:

- Retain existing forest, woodland and remnant grassland vegetation, including paddock trees;
- Retain dead timber on the ground in open woodland areas; and
- Increase the size of existing remnants, by planting trees and establishing buffer zones of un-modified, uncultivated pasture around woodland remnants.

For the three robins assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening processes (TSC Act) have been identified as being relevant to the species included within this assessment:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and nesting sites habitat for all of these robin bird species. A common threat across these bird species is fragmentation of habitat caused by vegetation clearing. Robins are also threatened by high rates of vegetation regrowth which occurs after disturbance events.
- Removal of dead wood and dead trees; reduction in the structural complexity of habitat, including reductions in canopy cover, shrub cover, ground cover, logs, fallen branches and leaf litter. Robins are threatened by degradation and simplification of habitat by the removal of standing dead timber, logs and coarse woody debris.
- Invasion of native plant communities by exotic perennial grasses; Robins are threatened by modification and destruction of ground- and shrub layers within habitat caused by removal of native plants, litter and fallen timber and the introduction of exotic pasture grasses.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The construction of the easement across Alignment West as well as the augmentation of the existing 132kV easement across Alignment East may increase potential hunting grounds for local cat populations and put greater predation pressure on Robin bird populations. *Petroica phoenicea* is also threatened by the robbing of nests and predation of fledglings by rats.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.23 Waterbirds: Bush-hen (*Amaurornis olivaceus*); Black-necked Stork (*Ephippiorhynchus asiaticus*); Brolga (*Grus rubicunda*); Comb-crested Jacana (*Irediparra gallinacea*); Black-tailed Godwit (*Limosa limosa*); Red-backed Button-quail (*Turnix maculosa*); and Australian Painted Snipe (*Rostratula benghalensis australis).*

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

Amaurornis olivaceus is known to occur within the Clarence Lowlands, Richmond – Tweed and Woodenbong sub-regions of the Northern Rivers CMA. The closest previous record of this species in proximity to the proposed Project is a historical record approximately 15km to the South of Piora. This distance is considered a sufficient buffer from any direct Project impacts

including all pre-construction, construction and post-construction activities. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Ephippiorhynchus asiaticus is known to occur within the Nandewar, Northern Complex subregion of the Border Rivers/Gwydir CMA and known to occur across relevant sub-regions of the Northern Rivers CMA. There are numerous records of this species in proximity to the project area between Drake and Lismore. No individuals of this species were observed during URS field surveys. Given the mobile nature of this species, the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Grus rubicunda is known to occur within the Clarence Lowlands, Clarence Sandstones and Richmond - Tweed sub-regions of the Northern Rivers CMA. The closest previous record of this species to the proposed Project area is approximately 20km to the south of Tatham. This distance is considered a sufficient buffer from any direct Project impacts including all pre-construction, construction and post-construction activities. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Irediparra gallinacea is known to occur within in the Clarence Lowlands, Clarence Sandstones, Richmond - Tweed and Woodenbong sub-regions of the Northern Rivers CMA. There are a number of previous records of this species around Casino (Alignment East). No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Limosa limosa is known to occur within the Clarence Lowlands sub-region of the Northern Rivers CMA with no known geographic restrictions. There is one historic record of this species in close proximity to the proposed Project at Casino. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Turnix maculosa is known to occur within the Clarence Lowlands, Clarence Sandstones and Richmond - Tweed sub-regions of the Northern Rivers CMA. There are previous records of this species between Casino and Lismore. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Rostratula benghalensis australis is known to occur within the Northern Rivers CMA, it is known to occur within the Clarence Lowlands and Clarence Sandstones sub-regions, and is predicted to occur within the Richmond - Tweed. There is one previous record of this species approximately 15km to the South of Lismore substation. No individuals of this species were observed during URS field surveys. Given the presence of the existing 132kV easement and associated access tracks across Alignment East as well as the presence of suitable habitat outside of the Project area, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Amaurornis olivaceus inhabits tall dense understorey or ground-layer vegetation on the margins of freshwater streams and natural or artificial wetlands, usually within or bordering rainforest, rainforest remnants or forests. These habitats are typical of some found within the study area east. Proposed project activities at locations consistent with *Amaurornis olivaceus* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

Ephippiorhynchus asiaticus are mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. These habitats are typical of some found within study area east. Proposed project activities at locations consistent with *Ephippiorhynchus asiaticus* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing

132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

*Grus rubicunda o*ccur in shallow wetland areas. Their main habitat is freshwater meadows or shallow freshwater marshes, although they have been known to nest in deep freshwater marshes and in the shallows of permanent open water in association with vegetation. These habitats are typical of some found within the study area east. Proposed project activities at locations consistent with *Grus rubicunda* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

Irediparra gallinacea inhabits permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Proposed project activities at locations consistent with *Irediparra gallinacean* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian environments, and strict adherence to proposed mitigation measures.

In inland areas, *Limosa limosa* occurs on mudflats and in those portions of large muddy lakes and swamps (freshwater or brackish) where the water is less than 10 cm deep. Proposed project activities at locations consistent with *Limosa limosa* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland areas, and strict adherence to proposed mitigation measures.

Turnix maculosa inhabit grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas, typically only in regions subject to annual summer rainfall greater than 400 mm. Observations of populations suggest the species prefers sites near water, including grasslands and sedgelands near creeks, swamps and springs, and wetlands. Proposed project activities at locations consistent with *Turnix maculosa* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland and riparian areas, and strict adherence to proposed mitigation measures.

Rostratula benghalensis australis prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Proposed project activities at locations consistent with *Rostratula benghalensis australis* habitat is not considered likely to further fragment or isolate the species, given the mobility of the species, the presence of the existing 132kV easement, the preferential avoidance of activities to be carried out in sensitive wetland areas, and strict adherence to proposed mitigation measures.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

To date, no recovery or threat abatement plans have been developed for the waterbird species considered within this Biodiversity Assessment. As such, the proposed works are not inconsistent with any objectives or actions of a recovery plan or threat abatement plan.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Amaurornis olivaceus* species recovery. The four key recovery strategies relevant to the Project include:

- Control introduced predators, such as Red Foxes and feral Pigs, and restrain domestic Cats, particularly at night;
- Protect wetlands from clearing, filling, draining, sedimentation and pollution;
- Avoid use of herbicides and pesticides near wetlands; and
- Control weeds in and next to wetlands.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Ephippiorhynchus asiaticus* species recovery. The five key recovery strategies relevant to the Project include:

- Avoid modification and degradation of wetland habitats or any reduction of levels of Black-necked Stork prey within them, as a result of grazing by stock (though strategic grazing may be used to enhance surrounding habitat), urban and agricultural run-off and pollution, including pesticides and herbicides. Although artificial water sources can provide foraging habitat, such wetlands are often suboptimal habitat;
- Manage wetlands and their catchments to ensure natural hydrological regimes are maintained to provide suitable habitat for Storks seasonally and annually, including during periods of drought;
- The most important management action for Black-necked Storks in NSW is to prevent them flying into powerlines, by routing or re-routing powerlines away from wetlands and floodplains and potential nesting areas on floodplains, and by attaching discs to existing powerlines where Storks, and other birds, regularly fly;
- Prevent loss and degradation of wetlands within the range of the species;
- Prevent widespread clearance of tall isolated paddock trees that provide or potentially provide suitable nesting sites for the species, and also avoid widespread clearance of floodplain vegetation; and
- Minimise human disturbance around known and potential nesting sites and preferred wetlands.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Grus rubicunda* species recovery. The key recovery strategy relevant to the Project is:

- Retain or reintroduce ecologically sustainable water flows to wetland habitat.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Irediparra gallinacea* species recovery. The three key recovery strategies relevant to the Project include:

- Retain or reintroduce ecologically sustainable water flows to known or potential wetland habitats;
- Protect all known or potential wetland habitats from flood mitigation works, clearing or development close to wetlands, including a vegetated buffer of at least 200 metres around the perimeter of the wetland; and
- Control Red Foxes (*Vulpes vulpes*) and other potential introduced predators.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Limosa limosa* species recovery. The three key recovery strategies relevant to the Project include:

- Searches for the species should be conducted in suitable habitat in proposed development areas in appropriate time of the year;

- Manage estuaries and inland water-bodies and the surrounding landscape, to ensure the natural hydrological regimes are maintained; and
- Protect and maintain known or potential habitats; implement protection zones around known habitat sites and recent records.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Turnix maculosa* species recovery. The three key recovery strategies relevant to the Project include:

- Reduce habitat destruction pressures from agriculture and urban development;
- Control introduced predators, especially Red Foxes; and
- Protect and restore Red-backed Button-quail habitats, especially preventing drainage or destruction of key wetlands and habitats, as the species shows some preference for nesting near water.

In lieu of a formalised recovery plan, DECCW has developed a number of priority actions and strategies to assist in the *Rostratula benghalensis australis* species recovery. The four key recovery strategies relevant to the Project include:

- Control foxes, feral dogs and cats;
- Protect wetlands and watercourses from pollution;
- Limit the use of pesticides and other chemicals near wetlands and consider alternatives where available; and
- Protect wetlands and associated marshy areas from clearing or disturbance.

For all waterbirds assessed, assuming mitigation measures are adopted, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening processes (TSC Act) have been identified as being relevant to the waterbird species included within this assessment:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands – this key threatening process is common across the waterbirds assessed. These species are threatened by the clearing, filling and draining of wetlands and watercourse for various anthropogenic activities. Waterbirds are threatened by the modification or degradation of wetland environments which provide foraging, breeding and nesting habitat. The project would involve the upgrade and construction of a number of new watercourse crossings as identified within **Appendix E** of the EA (Volume II).
- Clearing of native vegetation - Black-necked Storks in particular are threatened by the potential loss/ clearing of paddock trees which they rely on for nesting sites.
- Predation by feral cats – cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local cat populations and put greater predation pressure on local waterbird populations.
- Predation by the European red fox – foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local fox populations and put greater predation pressure on local waterbird populations.
- Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*) – This is an identified Key Threatening Process for both *Amaurornis olivaceus* and *Turnix maculosa*.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005). Threatened Species Profile. Bush-hen – profile. Viewed online 19/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10350

NSW Scientific Committee (2008). Final determination. Black-necked stork - endangered species listing. Viewed online 11/11/2010. http://www.environment.nsw.gov.au/determinations/BlackneckedStorkEndSpListing.htm

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NSW Scientific Committee (2004). Final determination. Painted Snipe - Endangered species listing. Viewed online 11/11/2010. http://www.environment.nsw.gov.au/determinations/PaintedSnipeEndSpListing.htm

1.1.24 Macropods: Rufous Bettong (*Aepyprymnus rufescens*); Black-Striped Wallaby (*Macropus dorsalis*); Parma Wallaby (*Macropus parma*), Brush-tailed Rock Wallaby (*Petrogale penicillata*), Long-nosed Potoroo (*Potorous tridactylus*), and Red-legged Pademelon (*Thylogale stigmatica*).

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*

Aepyprymnus rufescens has largely vanished from inland NSW areas but there are sporadic, unconfirmed records from the Pilliga and Torrington districts. This species was not recorded during URS surveys. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Macropus dorsalis occurs from the Townsville area in Queensland to northern NSW where it occurs on both sides of the Great Divide. On the north-west slopes of NSW it occurs in Brigalow remnants to south of Narrabri. On the north coast it is confined to the upper catchments of the Clarence and Richmond Rivers. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Macropus parma once occurred from north-eastern NSW to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to the Queensland border. This species was not observed during field surveys by URS. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Petrogale penicillata have a range which extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. This species was not recorded during URS surveys. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Potorous tridactylus is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. It is known to occur within the following sub-regions of the Northern Rivers CMA: Cataract, Clarence Lowlands, Richmond - Tweed, Rocky River Gorge, Stanthorpe Plateau and Woodenbong. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

Thylogale stigmatica has a patchy distribution along coastal and subcoastal eastern Australia from Cape York to the Hunter Valley in NSW. This species was not observed during field surveys by URS. Given the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. 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

2. 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

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Aepyprymnus rufescens inhabits a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Aepyprymnus rufescens* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Macropus dorsalis habitat is characterised by dense woody or shrubby vegetation occurring near a more open, grassy area to provide suitable feeding habitat. The clearing of vegetation, some of which is consistent with *Macropus dorsalis* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Macropus parma habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Macropus parma* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Petrogale penicillata occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Petrogale penicillata* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Potorous tridactylus inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Potorous tridactylus* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

Thylogale stigmatica inhabit forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. These habitats are typical of some of the bushland found within the study area. The clearing of vegetation, some of which is consistent with *Thylogale stigmatica* habitat, is not considered likely to further fragment or isolate the species, given the existing 132kV easement across alignment east, the mobile nature of this species, the presence of suitable habitat outside of the Project area, and assuming mitigation measures are adopted.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DPI within the project area.

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

A number of 'Priority Actions have been identified to help the recovery of these species, those that are relevant to the proposed activity include:

- Control weeds in areas of known and potential habitat;
- Reconnect patches of known and potential habitat with wide, densely vegetated corridors;
- Monitor populations with shelter or feeding habitat occurring on private land;
- Undertake fox, feral cat, feral dog and rabbit control program targeting areas of known or high quality potential habitat;
- Apply mosaic pattern hazard burns to ensure that a range of age stands of heath is available;
- Manage burning to maintain the diversity and density of the understorey;
- Retain and protect stands of native vegetation, especially those known to contain populations of Red-legged Pademelons;
- Protect known and potential habitat from clearing, fragmentation and isolation;
- Retain rocky habitat and adjacent open forest or grassland areas;
- Retain habitat corridors between colony sites; and
- Protect *Petrogale penicillata* colony sites from human interference or disturbance (DEC 2005).

For all Macropods assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening processes (TSC Act) have been identified as being relevant to the species included within this assessment:

- Clearing of native vegetation and land clearing; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for this species.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132 kV easement may increase potential hunting grounds for local cat populations and put greater predation pressure on local populations of small mammals by feral cats.
- Predation by the European red fox (TSC Act); foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132 kV easement may increase potential hunting grounds for local fox populations and put greater predation pressure on local populations of small mammals by foxes.
- Competition and grazing by the feral European rabbit (TSC); rabbit populations are known to occur within the vicinity of the alignment, and the proposed actions will increase the area of cleared grassy sections within the study area. Providing greater feeding potential for local rabbit populations and potentially reducing foraging areas for the small mammals.

Conclusion

A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW National Parks and Wildlife Service (2003) Brush-tailed rock-wallaby (endangered Warrumbungles population) Recovery Plan. NSW NPWS, Hurstville NSW. Viewed online 19/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10605

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1.1.25 Large-eared Pied Bat (*Chalinolobus dwyeri*); Hoary Wattled Bat (*Chalinolobus nigrogriseus*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Golden-tipped Bat (*Kerivoula papuensis*), Large-footed Myotis (*Myotis macropus*), Eastern Long-eared Bat (*Nyctophilus bifax*), Greater Long-eared Bat (*Nyctophilus timoriensis* (South-eastern form)), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Cave Bat (*Vespadelus troughtoni*)

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*

Chalinolobus dwyeri is listed as a vulnerable under the TSC and EPBC Act. The species is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Chalinolobus nigrogriseus is listed as a vulnerable under the TSC Act. The species is widely distributed across northern Australia although absent from the arid centre. In north east NSW it reaches the lower Clarence and Richmond River areas, extending from near Murwillumbah in the north, south to between Grafton and Coffs Harbour (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Falsistrellus tasmaniensis is listed as a vulnerable under the TSC Act. The species is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Kerivoula papuensis is listed as a vulnerable under the TSC Act. The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to Bega in southern NSW (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Myotis macropus is listed as a vulnerable under the TSC Act. It 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 (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Nyctophilus bifax is listed as a vulnerable under the TSC Act. They are found from Cape York through eastern Queensland to the far north-east corner of NSW. In NSW they appear to be confined to the coastal plain and nearby coastal ranges, extending south to the Clarence River area, with a few records further south around Coffs Harbour. The species can be locally common within its restricted range (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Nyctophilus timoriensis is listed as a vulnerable under the TSC and EPBC Act. Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Scoteanax rueppellii is listed as a vulnerable under the TSC Act. The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands. However, it does not occur at altitudes above 500 m (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Vespadelus troughtoni is listed as a vulnerable under the TSC Act. The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT (DEC, 2005). This species was not recorded during field surveys conducted throughout the study area. Assuming mitigation measures are adopted, the Project is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*

2. *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*

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Chalinolobus dwyeri roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Chalinolobus nigrogriseus occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Falsistrellus tasmaniensis prefers moist habitats, with trees taller than 20 m. They generally roost in eucalypt hollows, but have also been found under loose bark on trees or in buildings (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Kerivoula papuensis is found in rainforest and adjacent sclerophyll forest. They roost in abandoned Yellow-throated Scrubwren and Brown Gerygone hanging nests located in rainforest gullies on small first- and second-order streams. The species will fly up to two km from roosts to forage in rainforest and sclerophyll forest on upper-slopes (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

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

the water surface (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Nyctophilus bifax The species inhabits lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. They roost in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Nyctophilus timoriensis inhabits a variety of vegetation types, including mallee, bulloke (*Allocasuarina leuhmanni*) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. They roost in tree hollows, crevices, and under loose bark (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Scoteanax rueppellii utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

Vespadelus troughtoni are a cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. It is occasionally found along cliff-lines in wet eucalypt forest and rainforest (DEC, 2005). The Project may require the removal of potential habitat for this species, and will result in habitat fragmentation as a result of clearing the required easement. Given the species' large distribution and the presence of suitable habitat outside of the Project area, the habitat that will be cleared as part of the Project is not considered important to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No Recovery Plan or Threat Abatement Plan has been prepared to consider the requirements of these species. However, strategies that have been identified by (DEC,

2005) to help the recovery of this species, those which are relevant to the proposed activity include:

- Retain hollow-bearing trees and provide for hollow tree recruitment (future hollow-bearing trees).

Mitigation measures are recommended to minimise the potential impact on these species.

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

The Project may result in an increase to the following key threatening processes, which are considered relevant to all species included within this assessment:

- Clearing of native vegetation; the Project will require clearing of native vegetation, some of which constitutes roosting and/or foraging habitat for the species included within this assessment.
- Loss of hollow-bearing trees; hollow bearing trees are a key habitat resource for these species, providing important roost and shelter habitats. The Project will result in the removal of and disturbance to some hollow bearing trees from within the Project area.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10829

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Assessments of Significance

1.1 Flora

1.1.1 MacNutt's Wattle (*Acacia macnuttiana*)

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*

Acacia macnuttiana (Vulnerable, TSC Act; Vulnerable, EPBC Act) is restricted to NSW where it occurs only on the New England Tablelands and the North West Slopes. The species is found in widely scattered locations in the Tenterfield area and west to around Torrington. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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*

Acacia macnuttiana habitat includes dry forest or woodland and heath vegetation, usually on granite or metasediments and often near streams (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Acacia macnuttiana* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No formal recovery plan has been developed for *Acacia macnuttiana*. In lieu of a formalised recovery plan, DECCW has developed a series of recovery strategies for the species, of which the following are relevant to the Project:

- Manage fire to encourage regeneration of *Acacia macnuttiana*.
- Protect known populations and areas of potential habitat from clearing or disturbance.

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.*

The following key threatening process is considered relevant to *Acacia macnuttiana*, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which may constitute *Acacia macnuttiana* habitat.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). MacNutt's Wattle – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10018

1.1.2 Ooline (*Cadellia pentastylis*)

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

b) *Cadellia pentastylis* (TSC Act, Vulnerable) occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. Also occurs in Queensland (DEC, 2005). The species was detected during field surveys conducted within the study area, but does not occur within the easement. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction. *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*

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Cadellia pentastylis forms a closed or open canopy mixing with eucalypt and cypress pine species. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Cadellia pentastylis* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the easement, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Cadellia pentastylis*. In lieu of a formal recovery plan, DEC (2005) has identified 12 priority actions to help recover this species. The following are related to the Project:

- Assist with the control weeds in habitat areas.
- Protect populations and areas of potential habitat from clearing or disturbance.
- Expand and reconnect isolated remnants of habitat.
- Enter into conservation agreements to protect Ooline populations.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for this species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Ooline – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10118

1.1.3 Gibraltar Rock Apple (*Angophora exul*) and Sandstone Rough-barked Apple (*Angophora robur*)

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

Angophora exul (TSC Act, Endangered) is very rare, known only from a single small stand on Gibraltar Rock, west of Tenterfield. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Angophora robur (TSC Act, Vulnerable) occurs in a band from around Glenreagh, north-west of Coffs Harbour, to the Coaldale area north-west of Grafton, with an isolated occurrence farther west near Nymboida. It can be locally common. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Angophora exul is a rare species occurring only on open scree on a ridge of acid volcanic outcrops on Gibraltar Rock. The habitat is dry open woodland on the steep south-west slopes and crest of the outcrop, with skeletal to shallow loam soil (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Angophora exul* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Angophora robur habitat includes dry open forest in sandy or skeletal soils on sandstone, or occasionally granite, with frequent outcrops of rock (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Angophora robur* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Angophora exul.* In lieu of a formal recovery plan, DEC (2005) has identified six strategies to help recover this threatened species. Each of these strategies has a number of priority actions within it. The following are related to the Project:

- Assist with the control of feral goats in areas of known and potential habitat.
- Protect areas of known or potential habitat from clearing or disturbance.
- Report any new records of Gibraltar Rock Apple to the DEC.

To date, no formal recovery plan has been developed for *Angophora robur*. In lieu of a formal recovery plan, DEC (2005) has identified 17 priority actions to help recover this species. The following are related to the Project:

- Manage fire to promote regeneration.
- Identify populations and areas of habitat along roadsides and protect them during road works.
- Protect areas of habitat from clearing and development.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Gibraltar Rock Apple – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10052

DEC (2005). Sandstone Rough-barked Apple – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10054

1.1.4 White Laceflower (*Archidendron hendersonii*) and Rusty Plum (*Niemeyera whitei*)

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

Archidendron hendersonii (TSC Act, Vulnerable) is distributed from north Queensland south to the Richmond River in north-east NSW. This species is also considered likely to occur within the study area. Given the small size of known populations that exist, and the small size of the stands of rainforest in which they are recorded by DECCW. Therefore the Project has the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Niemeyera whitei (TSC Act Vulnerable) is found in the coast and adjacent ranges of northern NSW from the Macleay River into southern Queensland. Its distributional stronghold is on the mid north coast around Coffs Harbour. This species was not identified during survey however is considered likely to occur within the study area. The Project has the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Mitigation measures are recommended to minimise the potential impact on these species.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically

endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Archidendron hendersonii (TSC Act, Vulnerable) occurs in riverine and lowland subtropical rainforest and littoral rainforest. The Project will require the clearing of vegetation that may constitute potential *Archidendron hendersonii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Loss of habitat through clearing and fragmentation is one of this species' main threats. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Niemeyera whitei (TSC Act, Vulnerable*)* is found in rainforest and the adjacent understorey of moist eucalypt forest. The Project will require the clearing of vegetation that may constitute potential *Niemeyera whitei* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Clearing of habitat for development is one of this species' main threats. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Mitigation measures are recommended to minimise the potential impact on these species.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

There are no existing recovery plans for the *Archidendron hendersonii and Niemeyera whitei.* However DECCW (2005) has defined several recovery actions for each species. The following are related to the Project:

Archidendron hendersonii

- Ensure regional fire plans, hazard reduction burn guidelines include protocols for protecting rainforest habitats
- Survey before road and track maintenance in the habitat of the species, protect road and trackside plants
- Assess weed threats to populations, manage as necessary
- Ensure that managers are aware of populations and habitat
- Survey before road and track maintenance in the habitat of the species, protect road and trackside plants.

Niemeyera whitei

- Provide map of known occurrences to Rural Fire Service and seek inclusion on Bush Fire Risk Management Plan(s), risk register and operation map(s)
- Ensure the species is considered in statutory plans relevant to its distribution

- Protect areas of known habitat from timber harvesting and other land clearing
- Ensure threats to the species are adequately considered in parks and reserves management planning, implement plans
- Control weeds in known habitat for this species
- Model habitat to identify sites for further survey
- Survey before road and track maintenance in the habitat of the species. Assess need to protect trackside plants.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening processes are considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for *Archidendron hendersonii* and *Niemeyera whitei* species.
- Invasion, establishment and spread of *Lantana camara*; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of *Lantana camara* within the Project area. *Lantana camara* has the potential to compete with *Niemeyera whitei* species, and reduce their potential habitat within the locality.

Mitigation measures are recommended to minimise the potential impact on these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species - *Archidendron hendersonii*. Viewed online 25/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10062

Department of Climate Change and Water (2005) Threatened species - *Niemeyera whitei.* Viewed online 25/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10044

1.1.5 Native Jute (Corchorus cunninghamii)

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*

Corchorus cunninghamii (TSC Act, Endangered) occurs from Richmond River in north east NSW to the Brisbane River in Queensland. Four distinct populations occur within Queensland between the Beenleigh district and the lower Brisbane River. *Corchorus cunninghamii* was not recorded during field surveys however as been recorded in NSW from foothill and range country north of the Richmond River between Lismore, Toonumbar and Mt Lindsay near the Queensland border. It has also been listed as likely to occur within the Project area according to previous research (EPBC Act Protected Matters Report, 2010). The works associated with the Project have the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Mitigation measures are recommended to minimise the potential impact on this species.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Corchorus cunninghamii occurs primarily in open forest in Queensland and tall wet scelophyll forest and a hoop pine plantation in NSW. In NSW it occurs at low to mid elevation (150-450m) and may have originally extended to footslopes near the Richmond floodplain, which are now largely cleared. The Queensland sites have a similar topography with occupancy in hilly to steep country at altitudes of 140-350m.

The Project will require the clearing of vegetation that may constitute potential *Corchorus cunninghamii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Mitigation measures are recommended to minimise the potential impact on this species.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

The draft NSW and National Recovery Plan for the *Corchorus cunninghamii* was developed in November 2004. This recovery plan considers the conservation requirements of the species within its known range across NSW and identifies the actions to be taken to ensure the long-

term viability of *Corchorus cunninghamii* in nature and the parties who will undertake these actions.

It is likely that *Corchorus cunninghamii* currently exists in the Project area based on previous research. Given the presence of the existing 132kV easement and associated disturbances, it is considered likely that the Project would have a significant impact on any populations of *Corchorus cunninghamii* that may exist. Given the existing disturbance regimes, the project is considered likely to interfere substantially with the recovery of *Corchorus cunninghamii*.

Mitigation measures are recommended to minimise the potential impact on this species.

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

The following key threatening processes are considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for this species.
- Invasion, establishment and spread of *Lantana camara*; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of *Lantana camara* within the Project area. *Lantana camara* has the potential to compete with this species, and reduce their potential habitat within the locality.

Mitigation measures are recommended to minimise the potential impact on this species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Environment and Conservation (NSW) (2004) Draft NSW and National Recovery Plan *Corchorus cunninghamii* November 2004. Viewed online 23/11/2010 http://www.environment.nsw.gov.au/resources/nature/recoveryplanDraftCorchorusCunninghamii.pdf

Department of Climate Change and Water (2005) Threatened species. Viewed online 23/11/2010 http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10177

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Report.

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010 http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.6 Netted Bottlebrush (*Callistemon linearifolius*)

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*

Callistemon linearifolius (TSC Act, Vulnerable) is known or predicted to occur in the Clarence Lowlands and Claranece Sandstones sub-regions of the Northern Rivers Catchment Management Region, growing in dry sclerophyll forest on the coast and adjacent ranges. The

species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Callistemon linearifolius grows in dry sclerophyll forest on the coast and adjacent ranges (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Callistemon linearifolius* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Callistemon linearifolius*. In lieu of a formal recovery plan, DEC (2005) has identified 11 priority actions to help recover this species. The following are related to the Project:

- Search for the species in suitable habitat in areas that are proposed for development or management actions, protect any such site found.

- Protect known habitat from clearing or disturbance.
- Determine response of species to fire and develop and promote a recommended fire regime.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to *Callistemon linearifolius*, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which may constitute *Callistemon linearifolius* habitat;
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with this species, and reduce its potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Netted Bottlebrush – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10129

1.1.7 Rusty Rose Walnut (*Endiandra hayesii*), Rough-shelled Bush Nut (*Macadamia tetraphylla*) and Onion Cedar (*Owenia cepiodora*)

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

Endiandra hayesii has (TSC Act, Vulnerable) a restricted distribution from Burleigh Heads in Queensland to the Richmond River in north-east NSW, where it locally abundant in some locations. This species was not located however is listed as likely to occur within the Project area according to previous research (Atlas of NSW Wildlife, EPBC Act Protected Matter Report). The works associated with the Project have the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Macadamia tetraphylla (TSC Act, Vulnerable) is largely confined to the Richmond and Tweed Rivers in north-east NSW, with a limited range extending across the border into Queensland. This species was not located however is also listed as likely to occur within the Project area. The works associated with the Project have the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Owenia cepiodora (TSC Act, Vulnerable) is distributed north from the Richmond River in north-east NSW, extending just across the Queensland border. This species was not located however is listed as likely to occur within the Project area according to previous research (Atlas of NSW Wildlife, EPBC Act Protected Matter Report). The works associated with the Project have the potential to have an adverse affect on the life cycle of this species such that a viable local population is placed at risk of extinction.

Mitigation measures are recommended to minimise the potential impact on these species.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Endiandra hayesii occurs in subtropical and warm temperate rainforests and Brush Box forests. The altitude varies from near sea-level to 800m. The Project will require the clearing of vegetation that may constitute potential *Endiandra hayesii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. This is important as fragmented populations of *Endiandra hayesii* are likely to suffer loss of genetic variation due to loss of individuals with unique genetic variants, inbreeding and genetic drift. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Macadamia tetraphylla is usually found in the subtropical rainforest near the coast, complex notophyll vineforest, at the margins of these forests and in mixed scelrophyll forest (DSEWPC, 2010a). The Project will require the clearing of vegetation that may constitute potential *Macadamia tetraphylla* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Owenia cepiodora occurs in subtropical and dry rainforest on or near soils derived from basalt. The Project will require the clearing of vegetation that may constitute potential *Owenia cepiodora* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Given that this species is likely to occur within the study area, the potential habitat to be removed is considered important to the long term survival of the species within the locality.

Mitigation measures are recommended to minimise the potential impact on these species.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

A recovery plan currently exists for the *Endiandra hayesii.* The overall objective of this recovery plan is to prevent the decline of populations of *Endiandra hayesii* in the wild, to ensure ongoing viability of wild populations, and to maintain the evolutionary potential of the taxa (Department of Environment and Conservation (NSW), 2004).

There are no existing recovery plans for the *Macadamia tetraphylla* and *Owenia cepiodora.* However DECCW (2005) has defined several recovery actions for each species. The following are related to the Project:

Macadamia tetraphylla

- Undertake habitat assessments at known sites and ascertain threats, considering information from previous surveys
- Ensure protection of population and its habitat is included in statutory planning in relevant shires
- Ensure that land managers and other stakeholders are aware of populations and habitat
- Prevent rainforest habitat loss, degradation and fragmentation
- Exclude stock from rainforest
- Undertake weed removal at priority sites
- Determine current population size and demography, liaising with University of New England researchers and Australia Macadamia Society.

Owenia cepiodora

- All populations occurring on roadside areas will be marked in the field
- Undertake site assessments and monitoring of exiting and new populations as located
- Investigate extent of distribution through targeted surveys.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening processes are considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for *Endiandra hayesii*, *Macadamia tetraphylla* and *Owenia cepiodora* species.
- Invasion, establishment and spread of *Lantana camara*; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of *Lantana camara* within the Project area. *Lantana camara* has the potential to compete with *Endiandra hayesii*, *Macadamia tetraphylla* and *Owenia cepiodora* species, and reduce their potential habitat within the locality.
- Invasion of native plant communities by exotic perennial grasses; the clearing of the required easement will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of exotic grasses within the Project area. Increased competition from exotic grasses has the potential to result in adverse effects to *Macadamia tetraphylla* species.

Mitigation measures are recommended to minimise the potential impact on these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species - *Endiandra hayesii*. Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10270

Department of Climate Change and Water (2005) Threatened species - *Macadamia tetraphylla.* Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10499

Department of Climate Change and Water (2005) Threatened species - *Owenia cepiodora.* Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10579

Department of Environment and Conservation (NSW) (2004) Approved NSW Recovery Plan – *Endiandra muelleri* subsp. *bracteata* (Green-leaved Rose Walnut) and *Endiandra hayesii* (Rusty Rose Walnut).

Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) 2010a. Species profile and threats database - *Macadamia tetraphylla*. Viewed online 25/11/2010
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=6581

Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) 2010b. Species profile and threats database - *Endiandra hayesii*. Viewed online 25/11/2010
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=13866

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife. Viewed online 24/11/2010
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.8 Ovenden's Ironbark (*Eucalyptus caleyi subsp. ovendenii*), Slaty Red Gum (*Eucalyptus glaucina*), Narrow-leaved Black Peppermint (*Eucalyptus nicholii*), Blackbutt Candlebark (*Eucalyptus rubida subsp. barbigerorum*), Wallangarra White Gum (*Eucalyptus scoparia*), Square-fruited Ironbark (*Eucalyptus tetrapleura*)

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*

Eucalyptus caleyi subsp. ovendenii (TSC Act, Vulnerable) occurs from west of Guyra to west of Tenterfield on the New England Tablelands of NSW. Localities include ‘Moorabinda’ station. The taxon is said to be common in the western half of Torrington State Conservation Area, occasionally dominating woodland communities. The species was located during field surveys within the broader study area and not within the easement. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Eucalyptus glaucina (TSC Act Vulnerable) is found only on the north coast of NSW and in separate districts: near Casino where it can be locally common and farther south, from Taree to Broke, west of Maitland. The species was not detected during field surveys conducted

within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Eucalyptus nicholii (TSC Act, Vulnerable) is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Eucalyptus rubida subsp. barbigerorum (TSC Act, Vulnerable) is known from scattered populations on the New England Tablelands from Guyra to the Tenterfield area. Most populations occur on private property. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Eucalyptus scoparia (TSC Act, Endangered) occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Eucalyptus tetrapleura (TSC Act, Vulnerable) is restricted to the coastal lowlands and foothills of northern NSW around Casino and Grafton. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Eucalyptus caleyi subsp. ovendenii grows in grassy woodland on dry, shallow soils of moderate fertility. The species prefers altitudes of 610 to 820 m, on granitic substrates. Locally abundant within its grassy woodland habitat. Juveniles were present in about half the sampled sites within Torrington State Conservation Area, indicating good recruitment. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus caleyi subsp. ovendenii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Eucalyptus glaucina grows in grassy woodland and dry eucalypt forest on deep, moderately fertile and well-watered soils. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus glaucina* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Eucalyptus nicholii grows in dry grassy woodland, on shallow and infertile soils, mainly on granite. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus nicholii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Eucalyptus rubida subsp. barbigerorum occurs on woodland on medium or high fertility soils and often on cold flats. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus rubida subsp. barbigerorum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Eucalyptus scoparia is found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus scoparia* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Eucalyptus tetrapleura is found in dry or moist eucalypt forest on moderately fertile soil, often in low areas with poor drainage. The Project will require the clearing of vegetation that may constitute potential *Eucalyptus tetrapleura* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the

study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Eucalyptus caleyi subsp. ovendenii*. In lieu of a formal recovery plan, DEC (2005) has identified 3 priority actions to help recover this species. The following are related to the Project:

- Protect populations of Ovenden's Ironbark from frequent fire.
- Control invasive exotic grasses such as Coolatai Grass in areas of habitat.
- Protect known populations and areas of potential habitat from clearing fragmentation or disturbance.
- Expand and reconnect isolated remnants of habitat.
- Rehabilitate and protect degraded areas of habitat.
- Report any new records of the species to the Department of Environment and Conservation (NSW).

To date, no formal recovery plan has been developed for *Eucalyptus glaucina.* In lieu of a formal recovery plan, DEC (2005) has identified 14 priority actions to help recover this species. The following are related to the Project:

- Fence areas of known habitat to protect from grazing stock and to promote regeneration.
- Protect areas of habitat from timber harvesting activities.
- Protect known populations and areas of potential habitat from clearing and development.

To date, no formal recovery plan has been developed for *Eucalyptus nicholii.* In lieu of a formal recovery plan, DEC (2005) has identified 22 priority actions to help recover this species. The following are related to the Project:

- Manage fire to promote regeneration.
- Practice sustainable grazing in areas of habitat and protect regenerating trees from grazing stock.
- Limit firewood collection in areas of habitat.
- Identify roadside populations and protect during road-works.
- Protect dry grassy woodland from clearing and fragmentation.

To date, no formal recovery plan has been developed for *Eucalyptus rubida subsp. barbigerorum.* In lieu of a formal recovery plan, DEC (2005) has identified 22 priority actions to help recover this species. The following are related to the Project:

- Identify roadside and easement populations and protect during road-works.
- Protect known populations and areas of potential habitat from clearing and timber collection.
- Rehabilitate disturbed areas of habitat.

No formal recovery plan has been developed for *Eucalyptus scoparia.* In lieu of a formalised recovery plan, DECCW has developed a series of recovery strategies for the species, of which the following are relevant to the Project:

- Protect known populations and areas of potential habitat from clearing and timber collection.
- Rehabilitate and protect disturbed areas of habitat.
- Notify the DEC of any new records in NSW

To date, no formal recovery plan has been developed for *Eucalyptus tetrapleura.* In lieu of a formal recovery plan, DEC (2005) has identified 22 priority actions to help recover this species. The following are related to the Project:

- Avoid frequent fire in areas of known habitat.
- Exclude stock by fencing habitat.
- Identify and protect populations in timber harvesting areas and along roadsides.
- Protect habitat from further clearing.
- Assist regeneration of habitat around isolated trees.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to *Eucalyptus caleyi subsp. ovendenii, Eucalyptus glaucina, Eucalyptus nicholii, Eucalyptus rubida subsp. barbigerorum, Eucalyptus scoparia* and *Eucalyptus tetrapleura* based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which may constitute may constitute habitat for these species;

The following key threatening process is considered relevant to *Eucalyptus caleyi subsp. ovendenii* based on the likely impacts of the Project:

- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with this species, and reduce its potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Ovenden's Ironbark – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10286

DEC (2005). Slaty Red Gum – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10295

DEC (2005). Narrow-leaved Black Peppermint – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10302

DEC (2005). Blackbutt Candlebark – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10312

DEC (2005). Wallangarra White Gum – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10315

DEC (2005). Square-fruited Ironbark – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10319

1.1.9 Lesser Creeping Fern (*Arthropteris palisotii*), Needle-leaf Fern (*Belvisia mucronata*), Narrow-leaf Finger Fern (*Grammitis stenophylla*) and Slender Screw Fern (*Lindsaea incisa*)

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

Arthropteris palisotii (TSC Act, Endangered) is thought to be found in north-eastern NSW and also in Queensland. This species may be extinct in NSW. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Belvisia mucronata (TSC Act, Endangered) is restricted to Queensland and NSW. In NSW, it is known from only five locations on the far north coast, north from Evans Head. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Grammitis stenophylla (TSC Act, Endangered) occurs in eastern Queensland and eastern NSW. In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabri. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Lindsaea incisa (TSC, Act, Endangered) is known only from a few locations between Woombah and just south of Coffs Harbour in NSW. It also occurs in north and south-east Queensland. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically

endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Arthropteris palisotii occurs in rainforest, mainly on tree trunks. (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Arthropteris palisotii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Belvisia mucronata forms small clumps on trees or rocks in dry rainforest or along creeks in moist open forest. Occurs in low numbers at all sites. (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Belvisia mucronata* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Grammitis stenophylla occurs in moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Grammitis stenophylla* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Lindsaea incisa occurs in dry eucalypt forest on sandstone and moist shrubby eucalypt forest on metasediments. It is usually found in waterlogged or poorly drained sites along creeks, where ferns, sedges and shrubs grow thickly (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Lindsaea incisa* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Arthropteris palisotii*. In lieu of a formal recovery plan, DEC (2005) has identified 5 priority actions to help recover this species. The following are related to the Project:

- Protect areas of rainforest from clearing or disturbance.
- Report any records of Lesser Creeping Fern to the DEC.
- Conduct targeted surveys in suitable habitat.

To date, no formal recovery plan has been developed for *Belvisia mucronata*. In lieu of a formal recovery plan, DEC (2005) has identified 5 priority actions to help recover this species. The following are related to the Project:

- Protect dry rainforest from fire.
- Protect areas of habitat during forestry activities.
- Assist with weed control activities in rainforest and moist open forest habitat.

To date, no formal recovery plan has been developed for *Grammitis stenophylla*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Protect areas of habitat from clearing and development.
- Help to re-establish potential moist forest habitat, especially along streams.

To date, no formal recovery plan has been developed for *Lindsaea incisa*. In lieu of a formal recovery plan, DEC (2005) has identified 11 priority actions to help recover this species. The following are related to the Project:

- Maintain natural drainage conditions of creeks, including poorly drained areas.
- Protect areas of habitat from development.
- Report new occurrences of this fern to the DEC.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.

The following key threatening process is considered relevant to *Belvisia mucronata* based on the likely inpacts of the Project:

- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with this species, and reduce its potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Lesser Creeping Fern – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10067

DEC (2005). Needle-leaf Fern – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10090

DEC (2005). Narrow-leaf Finger Fern – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10356

DEC (2005). Slender Screw Fern – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10482

1.1.10 Hairy Jointgrass (*Arthraxon hispidus*), Bluegrass (*Dichanthium setosum*) and Finger Panic Grass (*Digitaria porrecta*)

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

Arthraxon hispidus (TSC Act, Vulnerable) occurs over a wide area in south-east Queensland, and on the northern tablelands and north coast of NSW, but is never common. Also found from Japan to central Eurasia (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Dichanthium setosum (TSC Act, Vulnerable) occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, as well as in Queensland and Western Australia. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas (DEC, 2005). The species was detected during field surveys conducted within the broader study area, however were not found within the easement. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Digitaria porrecta (TSC Act, Endangered) occurs in NSW and Queensland. In NSW it is found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran. It largely occurs on private land (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically

endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Arthraxon hispidus is moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamp (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Arthraxon hispidus* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Dichanthium setosum is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. (Often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched). Associated with heavy basaltic black soils (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Dichanthium setosum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was found in fairly constricted locations within the easement and study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Digitaria porrecta is found in native grassland, woodlands or open forest with a grassy understorey, on richer soils. Often found along roadsides and travelling stock routes where there is light grazing and occasional fire. (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Digitaria porrecta* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Arthraxon hispidus*. In lieu of a formal recovery plan, DEC (2005) has identified 10 priority actions to help recover this species. The following are related to the Project:

- Avoid slashing or mowing around rainforest edges.
- Control introduced grasses in areas with known populations.
- Protect areas of rainforest, wet eucalypt forest and swamp from clearing and development.

To date, no formal recovery plan has been developed for *Dichanthium setosum*. In lieu of a formal recovery plan, DEC (2005) has identified 16 priority actions to help recover this species. The following are related to the Project:

- Control invasive exotic grasses in areas of habitat.
- Rehabilitate and protect degraded areas of potential habitat.
- Report any new records of Bluegrass to the DEC.

To date, no formal recovery plan has been developed for *Digitaria porrecta*. In lieu of a formal recovery plan, DEC (2005) has identified 16 priority actions to help recover this species. The following are related to the Project:

- Identify roadside populations and areas of habitat and protect during roadside maintenance activities.
- Protect known populations and areas of potential habitat from clearing and disturbance.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.

The following key threatening process is considered relevant to *Arthraxon hispidus and Dichanthium setos* based on the likely inpacts of the Project:

- Invasion of native plant communities by exotic perennial grasses; the clearing of the required easement will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of exotic grasses within the Project area. Increased competition from exotic grasses has the potential to result in adverse effects to these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Hairy Jointgrass – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10066

DEC (2005). Bluegrass – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10221

DEC (2005). Finger Panic Grass – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10222

1.1.11 Torrington Pea (*Almaleea cambagei*)

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

Almaleea cambagei (TSC Act, Endangered) occurs primarily within Torrington State Conservation Area on the New England Tablelands, with a few populations potentially occurring in the adjacent agricultural lands. The species is also reported from Girraween National Park in Queensland. It is known from fewer than 15 populations and has a highly restricted distribution with an extent of occurrence of approximately 88 square km (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Almaleea cambagei usually grows in wet heath and acid swamp areas and along watercourses on granite, above 900 m altitude (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Almaleea cambagei* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Almaleea cambagei*. In lieu of a formal recovery plan, DEC (2005) has identified 19 priority actions to help recover this species. The following are related to the Project:

- Protect known populations and areas of potential habitat from clearing or disturbance, including mining.
- Restoration of degraded areas of potential swamp habitat.
- Notify the DEC of any new records of Torrington Pea.
- Identify roadside populations and mark on maps used for planning maintenance activities.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for this species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.12 Swamp Foxglove (*Centranthera cochinchinensis*), Tenterfield Eyebright (*Euphrasia orthocheila subsp. peraspera*), Wandering Pepper Cress (*Lepidium peregrinum*), Sweet False Galium (*Oldenlandia galioides*). Tall Knotweed (*Persicaria elatior*), Native Milkwort (*Polygala linariifolia*), Rotala tripartita (*Rotala tripartita*), Heath Wrinklewort (*Rutidosis heterogama*), Austral Toadflax (*Thesium australe*)

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

Centranthera cochinchinensis (TSC Act, Endangered) occurs in northern Australia and south-east Asia and known from NSW north from Wooli (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Euphrasia orthocheila subsp. peraspera (TSC Act, Endangered) is probably extinct throughout much of its former range; this subspecies has been recorded from Dorrigo to Tenterfield and

west to Torrington, although most records are very old. Currently only known from two swamps in the Tenterfield area (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Lepidium peregrinum (TSC Act, Endangered) was thought to be extinct until recently rediscovered in NSW and Queensland. Targeted searches conducted in 2001 confirmed the species occurs in scattered refugia in north-eastern NSW (near Tenterfield) and south-eastern Queensland. The largest site containing most of the known *Lepidium peregrinum* population is in a designated Travelling Stock Reserve (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Oldenlandia galioides (TSC Act, Endangered) is known to occur in north-east NSW, from Whiporie State Forest south of Casino and one location in the Tweed district. Also occurs on the north-west plains of NSW and in Queensland, Northern Territory and Western Australia (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Persicaria elatior (TSC Act, Vulnerable) has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Polygala linariifolia (TSC Act, Endangered) is found from north of Copeton Dam and the Warialda area to southern Queensland; also found on the NSW north coast near Casino and Kyogle, and there is an isolated population in far western NSW near Weebah Gate, west of Hungerford. This species also occurs in Western Australia (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Rotala tripartita (TSC Act, Endangered) occurs in New South Wales, Queensland and the Northern Territory. In New South Wales the species is currently known from only two locations, one in the Casino district and one in the South Grafton area, in the northern part of the North Coast bioregion. These locations are separated by a distance of less than c. 100 km. The geographic distribution of the species in New South Wales is therefore highly restricted (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Rutidosis heterogama (TSC Act, Vulnerable) is found in scattered coastal locations between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are

adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Thesium australe (TSC Act, Vulnerable) is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Centranthera cochinchinensis is uncommon in swampy areas and other moist sites (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Centranthera cochinchinensis* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Euphrasia orthocheila subsp. peraspera has been recorded from 'moist open situations' such as swamps, however little is known about the habitat and ecology of this subspecies. It is partly parasitic upon other plants and may only be able to grow in close proximity to such host plants (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Euphrasia orthocheila subsp. peraspera* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Lepidium peregrinum occurs in an open riparian forest on the banks of the Tenterfield creek at Clifton. Sandy alluvium is the main soil type at the site. Associated species at the Clifton site are dominated by *Eucalyptus camaldulensis* and *Casuarina cunninghamiana*, with a variably dense shrubby understorey of *Hymenanthera dentata*, *Bursaria spinosa*, *Acacia fimbriata, Acacia floribunda, Callistemon viminalis* and *Leptospermum brachyandrum*. *Lepidium peregrinum* was most abundant in the tussock grassland fringe of the riparian open forest, comprising Poa species, *Lomandra longifolia* and *Paspalum dilatatum* (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Lepidium peregrinum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Oldenlandia galioides occurs in margins of seasonally inundated wetlands in paperbark swamps and Forest Red Gum Eucalyptus tereticornis woodlands (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Oldenlandia galioides* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Persicaria elatior normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Persicaria elatior* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Polygala linariifolia occurs in sandy soils in dry eucalypt forest and woodland with a sparse understorey. The species has been recorded from the Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of *Eucalyptus caleyi*, *Eucalyptus dealbata* and *Callitris*, and in yellow podsolic soil on granite in layered open forest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Polygala linariifolia* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Rotala tripartita is a riparian species that grows in free-standing water with sedges. There appear to be extreme fluctuations in abundance of the species, with plants observed to germinate prolifically and establish in large numbers after substantial rainfall. Individuals disappear above-ground during dry periods and may only persist during these times in the soil seed-bank. Surveys in the South Grafton area located two populations of *Rotala tripartita* growing in exposed silty clay on the edges of farm dams that were about 150m apart. Also known from Melaleuca freshwater coastal wetland (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Rotala tripartita* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Rutidosis heterogama grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Rutidosis heterogama* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Thesium australe occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*) (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Thesium australe* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality..

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Centranthera cochinchinensis*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Protect swamps and other moist sites from clearing, draining or disturbance.
- Report records of Swamp Foxglove to the DEC.
- Conduct targeted surveys in suitable habitat.

To date, no formal recovery plan has been developed for *Euphrasia orthocheila subsp. peraspera*. In lieu of a formal recovery plan, DEC (2005) has identified 27 priority actions to help recover this species. The following are related to the Project:

- Maintain natural hydrology of swamp areas where this plant occurs.
- Prevent trampling of populations by humans.
- Study and monitor populations to determine this plant's biology.

To date, no formal recovery plan has been developed for *Lepidium peregrinum*. In lieu of a formal recovery plan, DEC (2005) has identified 14 priority actions to help recover this species. The following are related to the Project:

- Ensure familiarity with the species before undertaking works in areas of potential habitat.
- Manage weeds in areas of known and potential habitat.
- Be careful with use of herbicides near areas of known habitat.
- Rehabilitate and protect areas of disturbed habitat.
- Survey for species in potential habitat and report any new locations to the DEC.

To date, no formal recovery plan has been developed for *Oldenlandia galioides*. In lieu of a formal recovery plan, DEC (2005) has identified 18 priority actions to help recover this species. The following are related to the Project:

- Ensure adequate buffers to development adjacent to wetlands and woodlands that provide habitat.
- Identify and protect populations during timber harvesting activities.

- Control introduced weeds.
- Protect seasonally inundated wetlands in paperbark swamps and Forest Red Gum Eucalyptus tereticornis woodlands from clearing or development.

To date, no formal recovery plan has been developed for *Persicaria elatior*. In lieu of a formal recovery plan, DEC (2005) has identified 1 priority action to help recover this species. The following are related to the Project:

- Provide information to landholders in areas likely to contain this species to enable them to identify it.
- Ensure that adequate survey is done for this species in development and clearing proposals in suitable habitat within its range.
- Protect wetland habitat containing (or likely to contain) this species.

To date, no formal recovery plan has been developed for *Polygala linariifolia.* In lieu of a formal recovery plan, DEC (2005) has identified 6 priority action to help recover this species. The following are related to the Project:

- Identify populations on roadsides and in logging areas, and protect them during works.
- Control invasive exotic grasses in areas of habitat.
- Protect areas of dry eucalypt forest and woodland on sandy soil from clearing.
- Notify the DEC of any additional records of Native Milkwort.

To date, no formal recovery plan has been developed for *Rotala tripartite.* In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Control and remove introduced weeds at known locations.
- Ensure the construction and maintenance of the access road, powerline and pipeline near Black Swamp are carried out in a manner which reduces erosion and sedimentation risk.

To date, no formal recovery plan has been developed for *Rutidosis heterogama.* In lieu of a formal recovery plan, DEC (2005) has identified 7 priority action to help recover this species. The following are related to the Project:

- Stay on formed tracks when visiting heath areas to avoid trampling plants.
- Identify roadside populations and protect during roadside maintenance works.
- Protect areas of heath and moist open forest from clearing and development.

To date, no formal recovery plan has been developed for *Thesium australe.* In lieu of a formal recovery plan, DEC (2005) has identified 15 priority action to help recover this species. The following are related to the Project:

- Protect known populations from changes to land use.
- Do not undertake road works, pasture modification or other changes in land use that may affect populations.
- Undertake weed control in and adjacent to populations, taking care to spray or dig out only target weeds.
- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).
- Search for new populations in potential habitat.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.

The following key threatening process is considered relevant to *Lepidium peregrinum*, *Oldenlandia galioides*, *Polygala linariifolia*, *Rotala tripartita* and *Thesium australe* based on the likely impacts of the Project:

- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce its potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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DEC (2005). Sweet False Galium – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10397

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DEC (2005). Native Milkwort – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10643

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1.1.13 Acalypha (*Acalypha eremorum*), Thorny Pea (*Desmodium acanthocladum*), Axe-Breaker (*Geijera paniculata*), Sweet Myrtle (*Gossia fragrantissima*), Ripple-leaf Muttonwood (*Myrsine richmondensis*), Rainforest Cassia (*Senna acclinis*) and Brush Sophora (*Sophora fraseri*)

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

Acalypha eremorum (TSC Act, Endangered) is widespread and moderately common in south-east Queensland, in NSW it occurs in only a few localities, including the Chaelundi, Lismore and Burringbar areas (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Desmodium acanthocladum (TSC Act, Vulnerable) occurs only in north-east NSW. It is found in the Lismore area, and there are also records from near Grafton, Coraki, Casino and the Mount Warning area (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Geijera paniculata (TSC Act, Endangered) is moderately common in restricted habitat in Queensland between the Brisbane River and the central Queensland coast, but very rare in north-east NSW, where it is known from the Tweed, Lismore and Wardell areas (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Gossia fragrantissima (TSC Act, Endangered) occurs in south-east Queensland and in north-east NSW south to the Richmond River. Mostly found on basalt-derived soils (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Myrsine richmondensis (TSC Act, Endangered) is known only from a few populations at Coraki, Boatharbour near Lismore, and the Cherry Tree area west of Casino (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Senna acclinis (TSC Act, Endangered) occurs in the Coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Sophora fraseri (TSC Act, Vulnerable) occurs north from the Casino district in north-east NSW, where it is very rare. Also in south-east Queensland where it is widespread but not common (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Acalypha eremorum occurs in subtropical rainforest, dry rainforest and vine thickets (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Acalypha eremorum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Desmodium acanthocladum occurs in dry rainforest and fringes of riverine subtropical rainforest on basalt-derived soils at low elevations (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Desmodium acanthocladum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Geijera paniculata is found in dry subtropical rainforest and vine scrub, often along rivers (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Geijera paniculata* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that

the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Gossia fragrantissima is found in dry subtropical and riverine rainforest. As it can coppice from roots left in the ground when rainforest is cleared, it is found at several sites as isolated plants in paddocks or regrowth (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Gossia fragrantissima* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Myrsine richmondensis is found in subtropical and dry rainforest and swamp forest on creek flats and slopes on basalt derived soil (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Myrsine richmondensis* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Senna acclinis grows in or on the edges of subtropical and dry rainforest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Senna acclinis* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Sophora fraseri is usually found in moist situations, often near rainforest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Sophora fraseri* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Acalypha eremorum.* In lieu of a formal recovery plan, DEC (2005) has identified 17 priority actions to help recover this species. The following are related to the Project:

- Stay on established tracks in rainforest areas to avoid trampling plants.
- Remove weeds where they threaten adult plants or regeneration.
- Protect areas of rainforest from clearing and development

To date, no formal recovery plan has been developed for *Desmodium acanthocladum.* In lieu of a formal recovery plan, DEC (2005) has identified 10 priority actions to help recover this species. The following are related to the Project:

- Protect known populations during roadworks.
- Control weeds.
- Protect known and potential habitat from clearing or development.
- Rehabilitate and expand streamside habitat.
- Notify the DEC of any new records of Thorny Pea.

To date, no formal recovery plan has been developed for *Geijera paniculata*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Control weeds in rainforest areas.
- Protect areas of suitable habitat from clearing or development.
- Expand and connect remaining remnants of habitat.

To date, no formal recovery plan has been developed for *Gossia fragrantissima.* In lieu of a formal recovery plan, DEC (2005) has identified 9 priority actions to help recover this species. The following are related to the Project:

- Fence rainforest remnants to protect them from cattle.
- Control weeds in dry subtropical and riverine rainforest.
- Protect areas of rainforest habitat.
- Expand and connect remaining remnants of habitat.

A recovery plan has been developed for *Myrsine richmondensis*; Ripple-leaf Muttonwood (*Rapanea* species A Richmond River) Recovery Plan (Department of Environment and Conservation (NSW) (2004)). The plan lists a series of recovery objectives and actions aimed at recovering the species in NSW. The following are relevant to the Project:

- The DEC will liaise with landowners and managers regarding the protection of any populations of Ripple-leaf Muttonwood occurring off DEC managed estate.
- Identify populations along roadsides and protect them during road-works.
- Control introduced weeds in rainforest and swamp forest areas.
- Protect moist forest habitats from further clearing or development.
- Notify the DEC of additional occurrences of Ripple-leaf Muttonwood

To date, no formal recovery plan has been developed for *Senna acclinis.* In lieu of a formal recovery plan, DEC (2005) has identified 8 priority actions to help recover this species. The following are related to the Project:

- Control and remove introduced weeds.
- Ensure correct identification of Senna weed species before removal.
- Protect habitat from clearing and logging.
- Initiate and encourage bush regeneration in habitat areas.

To date, no formal recovery plan has been developed for *Sophora fraseri.* In lieu of a formal recovery plan, DEC (2005) has identified 8 priority actions to help recover this species. The following are related to the Project:

- Protect areas of habitat during timber harvesting activities.
- Control weeds in and near habitat.
- Protect known and potential habitat from clearing and development.
- Report new records of Brush Sophora to the DEC.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce its potential habitat within the locality.
- Invasion of native plant communities by exotic perennial grasses; the clearing of the required easement will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of exotic grasses within the Project area. Increased competition from exotic grasses has the potential to result in adverse effects to these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.14 Brush Sauropus (*Phyllanthus microcladus*) and Creek Triplarina (Triplarina imbricata)

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

Phyllanthus microcladus (TSC Act, Endangered) in NSW is confined to a few locations in the Tweed, Brunswick, Richmond and Wilson River Valleys with an outlying population near Grafton. Also occurs in south-east Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Triplarina imbricata (TSC Act, Endangered) is only found only in a few locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Phyllanthus microcladus is usually found on banks of creeks and rivers, in streamside rainforest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Phyllanthus microcladus* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area,

the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Triplarina imbricata occurs along watercourses in low open forest with Water Gum (*Tristaniopsis laurina*) (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Triplarina imbricata* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Phyllanthus microcladus*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Remove weeds where they threaten adult plants or regeneration.
- Protect areas of streamside rainforest habitat from clearing or development.
- Expand and connect remaining fragments of streamside rainforest.
- Report new records of Brush Sauropus to the DEC.

To date, no formal recovery plan has been developed for *Triplarina imbricata*. In lieu of a formal recovery plan, DEC (2005) has identified 13 priority actions to help recover this species. The following are related to the Project:

- Take care to avoid damaging native vegetation at riverside recreation spots.
- Protect creekside habitat from fire.
- Protect creek-bank vegetation from disturbance.
- Assist with the control of introduced weeds in creekside habitats.
- Expand and connect remnants of creekside vegetation.
- Notify the DEC of additional occurrences of Creek Triplarina.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce their potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Brush Sauropus – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10624

DEC (2005). Creek Triplarina – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10812

1.1.15 Bailey's Cypress Pine (*Callitris baileyi*), Pygmy Cypress Pine (*Callitris oblonga*) and Red Lilly Pilly (*Syzygium hodgkinsoniae*),

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

Callitris baileyi (TSC Act, Endangered) is found sporadically in south-east Queensland. The only recent record in NSW is a small population in Koreelah National Park and adjacent private land on the NSW–Queensland border west of Woodenbong. Old records exist for Acacia Creek and Sandilands near Tabulam (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Callitris oblonga (TSC Act, Vulnerable) is represented by two subspecies in NSW and one in Tasmania. Subsp. parva occurs in northern NSW on the eastern edge of the New England Tablelands and subsp. corangensis is only known to occur naturally in the Corang River catchment (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Syzygium hodgkinsoniae (TSC Act, Vulnerable) has a restricted range from the Richmond River in north-east NSW to Gympie in Queensland. Locally common in some parts of its range, but otherwise sparsely distributed (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Callitris baileyi is found on rocky, hilly or mountainous areas, usually near creeks, and on shallow and often clay soils. In NSW the population occurs in open grassy eucalypt forest, near a creek (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Callitris baileyi* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Callitris oblonga usually grows in sand along watercourses in shrubland and open woodland in granite country; it also occurs in drier sites, including exposed ridges (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Callitris oblonga* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Syzygium hodgkinsoniae is usually found in riverine and subtropical rainforest on rich alluvial or basaltic soils (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Syzygium hodgkinsoniae* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Callitris baileyi.* In lieu of a formal recovery plan, DEC (2005) has identified 15 priority actions to help recover this species. The following are related to the Project:

- Protect areas with cypress pines from clearing or development.
- Notify the DEC of any new occurrences of Bailey's Cypress Pine.

To date, no formal recovery plan has been developed for *Callitris oblonga.* In lieu of a formal recovery plan, DEC (2005) has identified 9 priority actions to help recover this species. The following are related to the Project:

- Identify and protect populations and areas of habitat along roadsides and illegal tracks.
- Control weeds in habitat areas.
- Protect areas of known and potential habitat from clearing, fragmentation or disturbance.
- Expand and reconnect isolated remnants of habitat.

To date, no formal recovery plan has been developed for *Syzygium hodgkinsoniae*. In lieu of a formal recovery plan, DEC (2005) have developed recovery actions relevant to the Project:

- Identify roadside trees and protect them during road-works.
- Remove weeds in rainforest environments.
- Protect areas of suitable rainforest habitat from clearing or development.
- Expand, connect and rehabilitate remnants of rainforest.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.

The following key threatening process is considered relevant to *Callitris oblonga* and *Syzygium hodgkinsoniae* based on the likely impacts of the Project:

- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce its potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Bailey's Cypress Pine – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
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DEC (2005). Red Lilly Pilly – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
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1.1.16 Granite Babingtonia (*Babingtonia granitica*), Granite Boronia (*Boronia granitica*), Beadle's Grevillea (*Grevillea beadleana*), Binghi Homoranthus (*Homoranthus binghiensis*), Crescent-leaved Homoranthus (*Homoranthus lunatus*), Torrington Beard-heath (*Leucopogon confertus*), Rusty Desert Phebalium (*Phebalium glandulosum subsp. eglandulosum*), Nightcap Plectranthus (*Plectranthus nitidus*), McPherson Range Pomaderris (*Pomaderris notata*), Torrington Mint-bush (*Prostanthera staurophylla sensu stricto).*

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

Babingtonia granitica (TSC Act, Vulnerable) is restricted to three small populations in the tableland granite country around Stanthorpe, Queensland. There are no records of this species from NSW, but it is likely to occur in Bald Rock National Park, within the Stanthorpe Plaueau sub region of the Northern Rivers CMA. It was not observed during URS field survey. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Boronia granitica (TSC Act, Vulnerable) occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Grevillea beadleana (TSC Act, Endangered) is known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Shannon Creek south-west of Grafton. Historical records suggest it was also once found near Walcha. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Homoranthus binghiensis (TSC Act, Endangered) is restricted to the Torrington area south-west of Tenterfield, associated with isolated granitic outcrops in the far north-eastern tablelands region of NSW. It grows within sandy soil pockets in open and exposed situations on and around the margins of the outcrops. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Homoranthus lunatus (TSC Act, Vulnerable) occurs near Tenterfield and Torrington on the New England Tablelands of NSW, including Bald Rock and Boonoo Boonoo National Parks near Tenterfield. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Leucopogon confertus (TSC Act, Endangered) is known only from an early record near Torrington on the New England Tablelands. The species was not detected during field surveys conducted

within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Phebalium glandulosum subsp. eglandulosum (TSC Act, Endangered) is found in the Torrington district and in Severn River Nature Reserve north-west of Glen Innes, on the New England Tablelands. The species also occurs in Queensland. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Plectranthus nitidus (TSC Act, Endangered) occurs within both NSW and Queensland. Previously known only from Nightcap National Park near Terania Creek in northern NSW, however, the species has now been collected from the Nullum and Richmond Range State Forests. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Pomaderris notata (TSC Act, Vulnerable) occurs mainly in Queensland. In NSW it is known from five sites in the McPherson and Tweed Range areas, including Mount Warning National Park, Mebbin National Park and Limpinwood Nature Reserve. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Prostanthera staurophylla sensu stricto (TSC Act, Endangered) is currently known from a single granite outcrop in the Tenterfield area of the New England Tablelands. The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. 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

2. 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

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Babingtonia granitica grows in shallow peaty soil associated with crevices in extensive granite outcrops. The Project will require the clearing of vegetation that may constitute potential *Babingtonia granitica* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Boronia granitica grows on granitic soils amongst rock outcrops, often in rock crevices, and in forests and woodlands on granite scree and shallow soils. Important site characteristics include low precipitation and high levels of solar radiation. This semi-arid soil environment will have selected the more xerophytic species from the available regional assemblage of rainforest species. The Project will require the clearing of vegetation that may constitute potential *Boronia granitica* habitat. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Grevillea beadleana occurs within open eucalypt forest with a shrubby understorey. It is usually found on steep granite slopes at high altitudes. The Project will require the clearing of vegetation that may constitute potential *Grevillea beadleana* habitat. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Homoranthus binghiensis grows within sandy soil pockets in open and exposed situations on and around the margins of the outcrops. The species appears to prefer heath and shrubland patches in shallow soils at altitudes of 700 to 950 m. Associated species include Eucalyptus prava, Eucalyptus dealbata and Callitris endlicheri in the overstorey. The Project will require the clearing of vegetation that may constitute potential *Homoranthus binghiensis*. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Homoranthus lunatus grows in heath, shrub and woodland communities in sandy soils on granite outcrops and slopes. The Project will require the clearing of vegetation that may constitute potential *Homoranthus lunatus* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Leucopogon confertus possibly occurs in open forest and woodland on rocky granite areas. The Project will require the clearing of vegetation that may constitute potential *Leucopogon confertus* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential

habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Phebalium glandulosum subsp. eglandulosum is restricted to granite outcrop country on the New England Tablelands. It favours exposed and heathy granite areas with cracks and depressions of skeletal sandy soil located amongst the boulders. The Project will require the clearing of vegetation that may constitute potential *Phebalium glandulosum subsp. eglandulosum* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Plectranthus nitidus grows on rocky cliff-faces and boulders, in the shelter and shade provided by the adjacent rainforest. The Project will require the clearing of vegetation that may constitute potential *Plectranthus nitidus* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Pomaderris notata is known to occur within rocky basalt ranges in montane heaths and scrubs or in scrubby rainforest. The Project will require the clearing of vegetation that may constitute potential *Pomaderris notata* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Prostanthera staurophylla sensu stricto, within it's only current known population, the species occurs in shallow skeletal soil in rock crevices. The site is an exposed granite outcrop near the mountain summit, with skeletal gritty loam soil. Kunzea parvifolia is dominant around the outcrop, with Prostanthera staurophylla and Leptospermum variabile scattered amongst the Kunzea. The Project may require the clearing of vegetation that may constitute potential *Prostanthera staurophylla sensu stricto* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Babingtonia granitica*. In lieu of a formal recovery plan, DEC (2005) has identified 3 priority actions to help recover this species. The following are related to the Project:

- Protect areas of potential habitat from disturbance.
- Report any occurrences of Granite Babingtonia in NSW to the DEC.
- Carry out surveys for Granite Babingtonia in likely habitat.

A Recovery Plan has been prepared for *Boronia granitica* (NSW NPWS, 2002). It outlines a range of long term and immediate objectives for this species. These include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Recovery actions outlined for *Boronia granitica* of relevance to this project include:

- Retain bushrock in its natural setting and obtain rocks for gardens only from licensed dealers.
- Stay on established walking tracks when visiting national parks and other reserves.
- Enjoy viewing and photographing native wildflowers but leave them in the wild.
- Only buy plants from licensed nurseries.
- Assist with the control of feral goats in habitat areas.
- Manage fire to maintain populations. Liaise with the DEC concerning appropriate fire management.
- Protect known populations and habitat areas from grazing stock.
- Protect known populations and areas of potential habitat from clearing or disturbance.
- Report any new records to the DEC.

A Recovery Plan has been prepared for *Grevillea beadleana* (NSW NPWS, 2004). It outlines a range of long term and immediate objectives for this species. These include the maintenance of habitat value at key sites and throughout the former range by active participation in land-use planning processes and by active vegetation rehabilitation at strategic sites. Population monitoring objectives have also been set to allow assessment of the efficacy of management actions. Recovery actions outlined for *Grevillea beadleana* of relevance to this project include:

- Keep to established paths in national parks to avoid damaging plants.
- Enjoy native wildflowers by photographing them, rather than collecting them.
- Assist with the control of feral herbivores.
- Manage fire to encourage regeneration. Liaise with the DEC concerning appropriate fire management.
- Exclude stock from known and potential habitat.
- Prevent clearing or development of known or potential habitat.
- Encourage and support property agreements and voluntary conservation agreements.
- Report new records to the DEC.

To date, no formal recovery plan has been developed for *Homoranthus binghiensis.* In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions to help recover this species. The following are related to the Project:

- Protect areas of habitat from frequent fire.
- Protect areas of known and potential habitat from clearing, disturbance and fragmentation.
- Control of feral goats in habitat areas.
- Report new records of Binghi Homoranthus to the DEC.

No formal recovery plan has been developed for *Homoranthus lunatus.* In lieu of a formalised recovery plan, DECCW has developed a series of recovery strategies for the species, of which the following are relevant to the Project:

- Stay on established walking tracks when visiting rocky bushland areas.
- Support local Landcare groups.
- Assist with the control of feral goats and pigs in habitat areas.
- Identify roadside populations and protect during roadworks.
- Protect areas of rocky heath habitat from clearing and development.
- Protection from frequent fires.

- Notify the DEC of any new records of Granite Homoranthus.

To date, no formal recovery plan has been developed for *Leucopogon confertus.* In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions to help recover this species. The following are related to the Project:

- Observe hygiene protocols and track closure signs in national parks.
- Assist with the control of feral goats.
- Protect areas of potential habitat from heavy grazing by domestic stock.
- Protect areas of open forest and woodland in rocky areas from clearing and fragmentation.
- Report any new records of Torrington Beard-heath to the DEC.

To date, no formal recovery plan has been developed for *Phebalium glandulosum subsp. Eglandulosum*. In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions to help recover this species. The following are related to the Project:

- Assist with the control of feral goats.
- Protect habitat from frequent fire.
- Protect known populations and habitat areas from grazing stock.
- Protect areas of heath and shrubby open forest from clearing and disturbance.
- Rehabilitate and protect disturbed areas of potential habitat.
- Report new records of Rusty Desert Phebalium to the DEC.

To date, no formal recovery plan has been developed for *Plectranthus nitidus*. In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions. The following are related to the Project:

- It is important that all land managers are made aware of the species and that appropriate measures are taken to protect the habitat.
- Searches for the species should be conducted prior to any logging operations.
- Control introduced weeds in potential habitat areas.
- Protect known habitat.

To date, no formal recovery plan has been developed for *Pomaderris notata*. In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions to help recover this species. The following are related to the Project:

- Protect from too frequent fire.
- Protect habitat from trampling.
- Report new occurrences of the species to the DEC.
- Conduct searches for further populations in likely habitat.

To date, no formal recovery plan has been developed for *Prostanthera staurophylla sensu stricto*. In lieu of a formal recovery plan, DEC (2005) has identified a number of priority actions to help recover this species. The following are related to the Project:

- Enjoy viewing and photographing native wildflowers but leave them in the wild.
- Control feral goats in habitat areas.
- Protect areas of rocky woodland and heath habitat from grazing.
- Rehabilitate and protect native vegetation on disturbed granite outcrops.

For all rocky outcrop shrub species assessed, the proposed works are not inconsistent with any of the above recovery strategies outlined to assist in the recovery of these species. The priority actions and recovery strategies have been considered as part of the proposed mitigation measures addressed in **Section 7** of the Biodiversity Assessment.

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.

The following key threatening process (TSC Act) has been identified as being relevant to the shrub species included within this assessment:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which may constitute *Callistemon linearifolius* habitat;
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with this species, and reduce its potential habitat within the locality.
- Bushrock removal; *Boronia granitica* in particular is identified as threatened by the process of bushrock removal from the environment through destruction and disturbance of habitat.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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1.1.17 Northern Clematis (*Clematis fawcettii*), White-flowered Wax Plant (*Cynanchum elegans*), Slender Marsdenia (*Marsdenia longiloba*), Scrambling Lignum (*Muehlenbeckia costata*), Tinospora Vine (*Tinospora smilacina*), and Cryptic Forest Twiner (*Tylophora woollsii*).

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

Clematis fawcettii (TSC Act, Vulnerable) is widely dispersed areas in southern Queensland and in north-east NSW within the Northern Rivers CMA subregions: Clarence Lowlands, Woodenbong, Richmond-Tweed and Cataract (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Cynanchum elegans (TSC Act, Endangered) is restricted in NSW to Brunswick Heads in the north to Gerroa in the South and is found within the Northern Rivers CMA (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Marsdenia longiloba (TSC Act, Endangered) occurs in scattered sites on the north coast of NSW north from Barrington Tops. Also occurs in south-east Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Muehlenbeckia costata (TSC Act, Vulnerable) has a scattered distribution from Queensland to the Blue Mountains in NSW. Records on the New England Tablelands and North West Slopes include Bald Rock north of Tenterfield, Warra and Butterleaf National Parks near Glen Innes and Mt Kaputar. (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Tinospora smilacina (TSC Act, Endangered) is found north from the Coffs Harbour district in north-east NSW, where it is rare (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Tylophora woollsii (TSC Act, Endangered) is found from the NSW north coast and New England Tablelands to southern Queensland, but is very rare within that range. Grows in moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins. Thought to be wind-dispersed. Has been recorded from a number of locations including; Bald Rock National Park, Marengo State Forest, Sheas Nob State Forest, Clouds Creek State Forest, Ewingar State

Forest, Kangaroo River State Forest, Boonoo State Forest, Gibraltar Range National Park and Barrington Tops National Park. (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Clematis fawcettii occurs in drier rainforest, usually near streams (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Clematis fawcettii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Cynanchum elegans is found on the edge of dry rainforest vegetation (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Cynanchum elegans* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Marsdenia longiloba is found in subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Marsdenia longiloba* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential

habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Muehlenbeckia costata occurs in coarse sandy soils and peat in heath, mallee and open eucalypt woodland on granite or acid volcanic outcrops at higher altitudes (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Muehlenbeckia costata* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Tinospora smilacina occurs in dry rainforest and along the boundaries of dry rainforest and dry eucalypt forest (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Tinospora smilacina* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Tylophora woollsii grows in moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins. The species is thought to be wind-dispersed. It has been recorded from a number of locations including; Bald Rock National Park, Marengo State Forest, Sheas Nob State Forest, Clouds Creek State Forest, Ewingar State Forest, Kangaroo River State Forest, Boonoo State Forest, Gibraltar Range National Park and Barrington Tops National Park (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Tylophora woollsii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Clematis fawcettii*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Control weeds in rainforest habitat.
- Protect remaining habitat from further clearing.
- Report new occurrences of Northern Clematis, particularly adult vines, to the DEC.

To date, no formal recovery plan has been developed for *Cynanchum elegans*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Consider off-site impacts in the assessment of nearby developments.
- Prevent inappropriate water run-off entering sites.
- Install fencing to exclude livestock and machinery, and control access where required.
- Protect areas of known and potential habitat from clearing and further fragmentation.

To date, no formal recovery plan has been developed for *Marsdenia longiloba*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Control weeds likely to spread into suitable habitat.
- Limit use of herbicides to areas away from significant native vegetation.
- Protect areas of habitat from clearing.

To date, no formal recovery plan has been developed for *Muehlenbeckia costata*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Keep to formed tracks when visiting national parks.
- Protect areas of potential habitat from clearing or fragmentation.
- Report any new records of Scrambling Lignum to the DEC.

To date, no formal recovery plan has been developed for *Tinospora smilacina*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Identify populations near roads and harvesting areas and protect them during logging operations.
- Control weeds in and near known habitat, taking particular care when other species of vine require cutting.
- Protect areas of habitat from clearing.
- Expand and connect remaining areas of habitat.

To date, no formal recovery plan has been developed for *Tylophora woollsii*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Undertake weed control works.
- Protect known habitat from disturbance, clearing or spraying.

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce their potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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1.1.18 Rod's Star Hair (*Astrotricha roddii*), Bordered Guinea Flower (*Hibbertia marginata*), Weeping Paperbark (*Melaleuca irbyana*), and Tephrosia filipes (*Tephrosia filipes*)

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

Astrotricha roddii (TSC Act, Endangered) occurs in NSW in the Ashford area north of Inverell, including Kwiambal and Kings Plains National Parks, Severn River Nature Reserve and Severn River State Forest. Rod's Star Hair usually grows in low dry woodland and shrublands on granite and acid volcanic outcrops, often in rock crevices (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Hibbertia marginata (TSC Act, Vulnerable) is found in grassy or shrubby dry open eucalypt forest at low altitudes on sandstone. Occurs only in north-east NSW, where it is restricted to the southern Richmond Range between Casino and Grafton (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Melaleuca irbyana (TSC Act, Endangered) is found in only a few places in north-east NSW, including near Coraki, Casino and Coutts Crossing south of Grafton. Also occurs in near Ipswich south-east Queensland (DEC, 2005). The species was not detected during field

surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Tephrosia filipes (TSC Act, Vulnerable) is relatively widespread in QLD but in NSW confined to the north-eastern section from Guy Fawkes River National Park in the south to the Tenterfield district in the north. LGAs for which the species is known to occur include Tenterfield, Northern Rivers and Glen Innes Severn (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. *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*
2. *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*

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Astrotricha roddii usually grows in low dry woodland and shrublands on granite and acid volcanic outcrops, often in rock crevices (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Astrotricha roddii* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Hibbertia marginate is found in grassy or shrubby dry open eucalypt forest at low altitudes on sandstone (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Hibbertia marginate* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Melaleuca irbyana is usually found in open eucalypt forest in poorly drained, usually clay, soils (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Melaleuca irbyana* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Tephrosia filipes occurs in a range of woodland and forest habitats on soils derived from granite, sandstone or metasediments (DEC, 2005). The Project will require the clearing of vegetation that may constitute potential *Tephrosia filipes* habitat. This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measures are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Astrotricha roddii*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Stay on established walking tracks when visiting National Parks and other reserves to avoid damage to vegetation.
- Assist with the control of feral goats in habitat areas.
- Protect known populations and areas of potential habitat from clearing or disturbance.
- Report any new records of Rod's Star Hair to the DEC.

To date, no formal recovery plan has been developed for *Hibbertia marginate*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Identify roadside populations and protect them during road-works.
- Protect areas of known habitat during timber harvesting activities.
- Protect known and potential habitat from clearing or development.

To date, no formal recovery plan has been developed for *Melaleuca irbyana*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Protect known habitat from frequent fire.
- Identify plants on roadsides and protect during road works.
- Control weeds.
- Protect areas of known habitat from clearing and timber harvesting.

To date, no formal recovery plan has been developed for *Tephrosia filipes*. In lieu of a formal recovery plan, DEC (2005) has identified the following priority actions to help recover this species. The following are related to the Project:

- Avoid further clearing of habitat
- Control weeds which directly compete with *Tephrosia filipes*

- Ensure road-building activities do not impact on plants of *Tephrosia filipes* close to the road

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation within the Project area, some of which may constitute habitat for these species.
- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce their potential habitat within the locality.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Bordered Guinea Flower – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10400

DEC (2005). Rod's Star Hair - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10075

NSW Scientific Committee (1999) Melaleuca tamariscina subsp. irbyana (a shrub). Endangered species determination - final. DEC (NSW), Sydney. Viewed online 11/11/2010. http://www.environment.nsw.gov.au/determinations/MelaleucaTamariscinaEndSpListing.htm

DEC (2005). Weeping Paperbark – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10518

DEC (2005). Tephrosia filipes – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=20113

NSW Scientific Committee (2009) Tephrosia filipes - vulnerable species listing. Vulnerable species determination - final. DEC (NSW), Sydney. Viewed online 11/11/2010. http://www.environment.nsw.gov.au/determinations/tephrosiafilipesFD.htm

1.1.19 Leafless Tongue-orchid (*Cryptostylis hunteriana*), Spider orchid (*Dendrobium melaleucaphilum*), Pink Nodding Orchid (*Geodorum densiflorum*) and Hartman's Sarcochilus (*Sarcochilus hartmannii*)

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

Cryptostylis hunteriana (Vulnerable, EPBC Act; Vulnerable, TSC Act) has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost (DEC, 2005). The species was not detected during field surveys conducted within the

study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Dendrobium melaleucaphilum (TSC Act, Endangered) occurs in coastal districts and nearby ranges, extending from Queensland to its southern distributional limit in the lower Blue Mountains. In NSW, it is currently known from seven recent collections. There has been no subsequent confirmation from the locations of three earlier (pre-1922) collections and it is possible that these are now extinct (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Geodorum densiflorum (TSC Act, Endangered). There are thought to be less than 20 populations of Pink Nodding Orchid in NSW, all north of Bundjalung National Park, and including Tweed Shire. The species also occurs in Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

Sarcochilus hartmannii (TSC Act, Vulnerable) is found from the Richmond River in northern NSW to Gympie in south-east Queensland (DEC, 2005). The species was not detected during field surveys conducted within the study area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would result in an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

1. 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

2. 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

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Cryptostylis hunteriana does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*) (DEC, 2005). This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Dendrobium melaleucaphilum grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts (DEC, 2005). This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Geodorum densiflorum is found in dry eucalypt forest and coastal swamp forest at lower altitudes, often on sand (DEC, 2005). This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

Sarcochilus hartmannii favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000 m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees (DEC, 2005). This clearing of vegetation may also result in the fragmentation of potential habitat for this species. Assuming mitigation measure are adopted, and given that the species was not found during field surveys conducted within the study area, the potential habitat to be removed is considered to be of low importance to the long term survival of the species within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for *Cryptostylis hunteriana.* In lieu of a formal recovery plan, DEC (2005) has identified 4 priority actions to help recover this species. The following is related to the Project:

- Co-operatively develop (local governments and DEC) guidelines for survey and assessment, to be followed by developers, consultants and approval authorities.

No formal recovery plan has been developed for *Dendrobium melaleucaphilum*. In lieu of a formalised recovery plan, DECCW has developed a series of recovery strategies for the species, of which the following are relevant to the Project:

- Establish and maintain ex-situ collection of seed and plants.
- Protect areas of known and potential habitat from fire.
- Protect areas of known and potential habitat from clearing and fragmentation.

- Maintain confidentiality of locations to minimise illegal collection.

To date, no formal recovery plan has been developed for *Geodorum densiflorum*. In lieu of a formal recovery plan, DEC (2005) has identified 18 priority actions to help recover this species. The following are related to the Project:

- Protect areas of coastal eucalypt and swamp forest from clearing or development.
- Report new records of Nodding Swamp Orchid to the DEC.

To date, no formal recovery plan has been developed for *Sarcochilus hartmannii*. In lieu of a formal recovery plan, DEC (2005) has identified 6 priority actions to help recover this species. The following are related to the Project:

- Protect areas with known populations from disturbance.
- Assist with control of weeds near known populations.
- Report any records of Sarcochilus hartmannii to the DEC

Mitigation measures are recommended to minimise the potential impact on these species.

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

The following key threatening process is considered relevant to the species included within this assessment, based on the likely impacts of the Project:

- Clearing of native vegetation; the Project will require the clearing of native vegetation, some of which may constitute may constitute habitat for these species;

The following key threatening process is considered relevant to *Geodorum densiflorum* and *Sarcochilus hartmannii* based on the likely impacts of the Project:

- Invasion, establishment and spread of Lantana camara; the Project will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of Lantana camara within the Project area. Lantana camara has the potential to compete with these species, and reduce its potential habitat within the locality.
- Invasion of native plant communities by exotic perennial grasses; the clearing of the required easement will result in increased edge effect, which may increase the potential for the invasion, establishment and spread of exotic grasses within the Project area. Increased competition from exotic grasses has the potential to result in adverse effects to these species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Leafless Tongue-orchid – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10187

DEC (2005). Spider orchid – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10213

DEC (2005). Pink Nodding Orchid – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10349

DEC (2005). Hartman's Sarcochilus – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10745

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Assessments of Significance

1.1 Fauna

1.1.1 Tusked Frog (*Adelotus brevis*) Endangered Population in the Nandewar and New England Tableland Bioregions

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*

Not applicable. this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

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*

Adelotus brevis is found from central Queensland to southern NSW. The Project may require the removal of habitat that may be used by *Adelotus brevis* (DEC, 2005), however the nearest records are some distance from the Project area. Assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse effect on the life cycle of the species such that a viable local population is placed at risk of extinction.

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

Not applicable. this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Adelotus brevis occur within rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks, ditches and ponds and call while hidden amongst vegetation or debris. Assuming mitigation measures are adopted, the clearing of vegetation, some of which is consistent with *Adelotus brevis* habitat, is not considered likely to further fragment or isolate the species, given the presence of the existing 132kV easement. Given the numerous records of the species in the study area east, and the existing easement, the potential habitat that may

be impacted as a result of the proposed works is not considered important to the long term survival of the population within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No formal recovery plan has been developed for *Adelotus brevis*. In lieu of a formal recovery plan, DECCW has developed a series of recovery actions for the species, relevant to the Project:

- Only handle frogs when absolutely necessary;
- Take care with the use of pesticides and other chemicals near wetlands, ponds and streams;
- Protect native vegetation bordering streams and ponds from clearing or disturbance;
- Clean footwear, equipment and tyres before and after visiting frog sites; and
- Report any records to the DEC.

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.*

The following key threatening processes (under the TSC Act) have been identified as being relevant to *Adelotus brevis*:

- Clearing of native vegetation; the clearing of native vegetation could reduce potential breeding, foraging and shelter habitat for this species.
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis; the movement of vehicles and workers close to and across waterways may result in the spread of the disease to local populations of frogs.
- Predation by feral cats; cats and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local cat populations and put greater predation pressure on local frog populations.
- Predation by the European red fox; foxes and other predators are known to use tracks, roads and easements as hunting grounds. The augmentation of the existing 132kV easement may increase potential hunting grounds for local fox populations and put greater predation pressure on local frog populations.
- Removal of dead wood and dead trees; some frog species shelter under fallen timber and leaves, therefore the removal of such habitat during the project could reduce potential habitat area within the study area east.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC, (2005). Tusked Frog population in the Nandewar and New England Tableland Bioregions – profile. Viewed online 19/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=103032

1.1.2 Olive Perchlet (*Ambassis agassizii*) Endangered Population

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

Ambassis agassizii (Endangered Population, FM Act) occur in the Murray-Darling drainage system. Males and females reach sexual maturity in one year. Spawning occurs in November and December and females release adhesive eggs amongst aquatic vegetation. Records of this species exist within the study area west. Assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the life cycle of the species such that a viable population is placed at risk of extinction.

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

Not applicable. This factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

Not applicable. This factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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

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

(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

Ambassis agassizii inhabit rivers, creeks, ponds and swamps. They are usually found in slow-flowing or still waters, often near overhanging vegetation or amongst logs, dead branches and boulders. They often congregate around shelter sites (e.g. large woody debris (snags) and vegetation) during the day and disperse during the night to feed. The Project will require the upgrade or installation of water crossings throughout the Project area, which may result in some disturbance to potential *Ambassis agassizii* habitat. Several waterways within the Project Area are already spanned by various crossings. Given the presence of existing crossings, and assuming mitigation measures are adopted, it is considered unlikely that the Project would result in significant fragmentation or isolation of *Ambassis agassizii* habitat from other areas of habitat. The habitat that may be impacted by the Project is not considered to be of high importance to the long-term survival of the species in the locality, as the disturbance will be limited in extent, and minimised by mitigation measures recommended in **Section 7**.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No formal recovery plan exists for *Ambassis agassizii*. In Lieu of a recovery plan, the DII have developed a series of recovery actions, of which the following are relevant to the Project:

- Remove barriers and reinstate large woody debris; and
- Promote appropriate land management practices to improve water quality and river health (NSW DII, 2005).

Assuming mitigation measures are implemented, the Project will not conflict with the recovery strategies for this species.

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

The following key threatening processes (under the TSC Act) have been identified as being relevant to *Ambassis agassizii*:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands; any changes to the natural flow of waterways within the Project area may limit the potential of this species from moving throughout the locality.
- Predation by *Gambusia holbrooki*; this species is threatened by predation by the invasive species *Gambusia holbrooki*.
- Removal of dead wood and dead trees; dead wood within rivers is likely to provide potential habitat for this species.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW DII, (2005). Olive perchlet. Profiles for species, populations & ecological communities. Primary Industries, Fishing and Aquaculture. Viewed online 19/11/2010. http://pas.dpi.nsw.gov.au/Species/Species_Profile.aspx?SpeciesListingID=19

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Assessments of Significance

1.1 Threatened Ecological Communities

1.1.1 Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast; Sydney Basin and South East Corner Bioregions (Swamp Sclerophyll Forest)

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*

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

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*

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

Swamp Sclerophyll Forest (Endangered Ecological Community, TSC Act) is found within a number of LGAs within NSW, and is found within the Hawkesbury/Nepean, Hunter/Central Rivers, Northern Rivers, Southern Rivers and Sydney Metro CMAs. The Project will require the clearing of vegetation that constitutes this community. Given the widespread distribution of Swamp Sclerophyll Forest within NSW, and the amount of this community that will be cleared as a result of the Project, it is considered unlikely that the Project would result in the local occurrence being placed at risk of extinction.

The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity, nutrient and moisture content of the soil. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance (DEC, 2005).

The Project will require the clearing of and disturbance to, Swamp Sclerophyll Forest and will result in increased edge effect within the Project area. The Project may result in the establishment or spread of exotic species which may result in increased competition for native species. Assuming mitigation measures are adopted, it is not considered likely that the Project would result in a substantial change in the species composition of the Swamp Sclerophyll Forest outside the Project area; however there will be clearing of vegetation that constitutes this community within the Project area.

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

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

   (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*

Swamp Sclerophyll Forest relies upon specific abiotic conditions within areas of occurrence. It is considered unlikely that the project would modify these conditions to the extent that the community would be threatened in the locality.

Swamp Sclerophyll Forest occurs within the Project area in a fragmented state, due to historical agricultural and land clearing activities. Although the Project will require the clearing of vegetation that constitutes this community, it is considered that this additional clearing will not result in significantly increased fragmentation, due to the existing 132kV easement within the alignment east.

Given the distribution of the community throughout NSW, and its reliance upon specific abiotic conditions, it is considered that the impacts of the Project are of low importance to the long term survival of the community within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for Swamp Sclerophyll Forest. In lieu of a formal recovery plan, DECCW has developed a series of priority actions to assist in the recovery of the community within NSW. The following are relevant to the Project:

- Instigate pig, deer and goat control programs.
- Ensure that the fire sensitivity of the community is considered when planning hazard reduction and asset management burning.
- Protect habitat by minimising further clearing of the community. This requires recognition of the values of all remnants in the land use planning process.
- Promote regeneration by avoiding prolonged or heavy grazing.
- Undertake restoration including bush regeneration, revegetation and weed control, and promote public involvement in this restoration.

Assuming mitigation measures are adopted, the potential impact of the Project will be significantly lessened, however the Project will result in the clearing of areas of this community. Given the lack of formal recovery plans and the community's naturally widespread distribution, it is considered unlikely that the Project would significantly interfere in the recovery of Swamp Sclerophyll Forest.

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.*

The following key threatening process (TSC Act) that may threaten Swamp Sclerophyll Forest is considered relevant to the Project:

- Clearing of native vegetation; the Project will require the removal of vegetation that constitutes Swamp Sclerophyll Forest.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Swamp sclerophyll forest on coastal floodplains - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10786

1.1.2 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland)

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*

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

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*

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

Within NSW, Box Gum Woodland (Endangered Ecological Community, TSC Act; Critically Endangered Ecological Community, EPBC Act) is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. The Project will require the clearing of vegetation that constitutes this community. Given the widespread distribution of Box Gum Woodland within NSW, and the mapped extent of this community within the study area, it is considered unlikely that the Project would result in the local occurrence being placed at risk of extinction.

The species composition of Box Gum Woodland varies across the geographic distribution of the community, in response to changes in climate. Irrelevant of the distribution, the ground layer of intact stands is usually characterised by Kangaroo Grass (*Themeda australis*), Snow Grass (*Poa sieberiana*) and/or River Tussock (*Poa labillardieri*). As Box-Gum Grassy Woodland becomes degraded the dominance of *Themeda australis* and *Poa* species declines and other native grasses become dominant. With further degradation, native grasses are replaced by annual and perennial introduced species (Threatened Species Scientific Committee, 2006).

The Project will require the clearing of and disturbance to, Box Gum Woodland and will result in increased edge effect within the Project area. The Project may result in the establishment or spread of exotic grass species which may result in increased competition for native species. Assuming mitigation measures are adopted, it is not considered likely that the Project would result in a substantial change in the species composition of the Box Gum Woodland outside the Project area; however there will be clearing of vegetation that constitutes this community within the Project area.

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

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

Box Gum Woodland occurs within the Project area in a range of conditions, typically as a result of historical land uses within the area. The community has been historically cleared throughout much of its natural range due to its occurrence on fertile slopes that are highly suited to agricultural activities. As such, the Project will result in the disturbance to and clearing of various conditions of the community, as well as disturbance to land that may (with assisted regeneration practices) constitute potential habitat for the community.

The Project will require the clearing of an easement to incorporate the alignment, which will result in the fragmentation of areas of Box Gum Woodland.

Given the mapped extent of the community within the study area, and given the distribution of the community throughout NSW, it is considered that the impacts of the Project are of low importance to the long term survival of the community within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

A draft recovery plan was placed on public exhibition for comment early in 2010; *Draft National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Department of Environment, Climate Change and Water NSW, 2010). This plan has not been formalised. The draft recovery plan outlines several recovery objectives and actions to assist in the recovery of the community, relevant to the Project:

- Achieving no net loss in extent and condition of the ecological community throughout its geographic distribution.
- Increasing protection of sites in good condition.
- Increasing landscape functionality of the ecological community through management and restoration of degraded sites.

Assuming mitigation measures are adopted, the potential impact of the Project will be significantly lessened, however the Project will result in the clearing of areas of this community. Given the lack of formal recovery plans and the community's naturally widespread (although patchy) distribution, it is considered unlikely that the Project would significantly interfere in the recovery of the Box Gum Woodland community.

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.

The following key threatening processes (TSC Act) that may threaten Box Gum Woodland are considered relevant to the Project:

- Clearing of native vegetation; the Project will require the removal of vegetation that constitutes Box Gum Woodland.
- Invasion of native plant communities by exotic perennial grasses; the increase in edge effect as a result of clearing of native vegetation by the Project will increase the potential for invasion by exotic species within the understorey of the community.
- Loss of hollow-bearing trees; the Project will require the removal of hollow-bearing trees to clear the required easement. Box Gum Woodland provides habitat for a number of threatened fauna species that utilise hollow-bearing trees typical of the community.
- Removal of dead wood and dead trees; the Project will require the removal of dead wood and dead trees to clear the required easement. Box Gum Woodland provides habitat for a number of threatened fauna species that utilise dead wood and dead trees typical of the community.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Threatened Species Scientific Committee (2006). Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Viewed online 23/11/2010.
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/box-gum.pdf

Department of Environment, Climate Change and Water NSW (2010). Draft National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney.

DEC (2005). Box-Gum Woodland - profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10837

1.1.3 Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River (Darling River EEC)

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

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

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

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

The Darling River EEC includes all natural waterways of the Darling River within NSW, including Menindee Lakes and the Barwon River. Also included are the main Barwon-Darling channel from Mungindi (Qld-NSW border) to the confluence with the Murray River, the arid zone intermittent intersections streams (Warrego, Culgoa, and Narran Rivers), Border Rivers (Macintyre, Severn and Dumaresq Rivers), and regulated tributaries (Gwydir, Namoi, Macquarie, Castlereagh, and Bogan Rivers) (Department of Industry and Investment, 2005).

The Project will require the upgrade and installation of a number of waterway crossings within the Project area. Many of the waterway crossings within the western half of the Project area will require some disturbance to waterways that constitute the Darling River EEC. The works associated with the Project will not have an impact on the extent of the community such that its local occurrence is placed at risk of extinction.

The Darling River EEC is includes all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, anabranches, flow diversions to anabranches and the floodplains of the Darling River within NSW (Department of Industry and Investment, 2005). The project is considered unlikely to alter this composition, as the majority of waterways that will be subject to crossing installation or upgrades are already subject to some form of crossing. Assuming recommended mitigation measures are adopted, It is unlikely that additional disturbance associated with the Project will substantially or adversely modify the composition of the community such that its local occurrence is placed at risk of extinction.

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

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

(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

The Project would require modification to a number of waterways that constitute the Darling River EEC to ensure necessary access throughout the Project area. Assuming recommended mitigation measures are adopted, the extent of habitat modification or removal is not considered to be significant.

Many of the waterways that will be subject to disturbance as a result of the Project already have some form of crossing in place. Project works will require the upgrade of many of these crossings as well as the installation of some new crossings to allow large plant, machinery and vehicles to access the Project area during the construction process. Given the existence of existing crossings over many of the waterways, and assuming mitigation measures are adopted, works are considered unlikely to result in further fragmentation or isolation of any areas of habitat within this community.

The Project will require works within and directly adjacent to numerous waterways in the west of the Project area that are part of the Darling River EEC. Disturbance associated with the Project will be limited to localised areas of waterways in the Project area, many of which already have some form of existing crossing. Taking these points into consideration, and assuming mitigation measures are adopted, it is considered that the habitat to be modified is of low importance to the survival of the community within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

No recovery plan has been developed for the Darling River EEC. In lieu of a formal recovery plan, DII has developed six primary recovery strategies aimed at helping to recover the community. Those relevant to the Project are:

- Remediate barriers to fish passage
- Protect and reinstate large woody debris
- Restore riparian vegetation

Assuming mitigation measures are adopted, the Project is consistent with these recovery strategies.

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.

The key threatening process (KTP) that is most relevant to the Darling River EEC is:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands

The upgrade and construction of waterway crossings within the Project area has the potential to alter the natural flow of rivers and streams throughout the locality, if works are not conducted in an appropriate manner. Assuming mitigation measures are implemented however, it is considered that the Project does not constitute a KTP, nor is it likely to increase the impact of any KTP.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Industry and Investment, (2005). Darling River EEC. Profiles for species, populations & ecological communities. Primary Industries Fishing and Aquaculture. Viewed online 17/11/2010.
http://pas.dpi.nsw.gov.au/Species/Species_Profile.aspx?SpeciesListingID=21

1.1.4 Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (Sub-tropical Coastal Floodplain Forest)

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*

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

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*

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act

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

Sub-tropical Coastal Floodplain Forest (Endangered Ecological Community, TSC Act) is found within a number of LGAs within NSW, and is found within the Hunter/Central Rivers and Northern Rivers CMAs (DEC, 2005). The Project will require the clearing of vegetation that constitutes this community. Given the distribution of Sub-tropical Coastal Floodplain Forest within NSW, and the amount of this community that will be cleared as a result of the Project, it is considered unlikely that the Project would result in the local occurrence being placed at risk of extinction.

The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance (DEC, 2005). The Project will require the clearing of and disturbance to, Sub-tropical Coastal Floodplain Forest and will result in increased edge effect within the Project area. The Project may result in the establishment or spread of exotic species which may result in increased competition for native species. Assuming mitigation measures are adopted, it is not considered likely that the Project would result in a substantial change in the species composition of the Swamp Sclerophyll

Forest outside the Project area; however there will be clearing of vegetation that constitutes this community within the Project area.

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

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

(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

Sub-tropical Coastal Floodplain Forest relies upon specific abiotic conditions within an area, including suitable hydrology and soil properties. It is considered unlikely that the project would modify these conditions to the extent that the community would be threatened in the locality.

Sub-tropical Coastal Floodplain Forest occurs within the Project area in a fragmented state, due to historical agricultural and land clearing activities. Although the Project will require the clearing of vegetation that constitutes this community, it is considered that this additional clearing will not result in significantly increased fragmentation, due to the existing 132kV easement within the alignment east.

Given the distribution of the community throughout NSW, and the presence of the existing 132kV easement in the alignment east, it is considered that the impacts of the Project are of low importance to the long term survival of the community within the locality.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area.

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

To date, no formal recovery plan has been developed for Sub-tropical Coastal Floodplain Forest. In lieu of a formal recovery plan, DECCW has developed a series of priority actions to assist in the recovery of the community within NSW. The following are relevant to the Project:

- Instigate feral animal control programs.
- Ensure that the fire sensitivity of the community is considered when planning hazard reduction and asset management burning.
- Protect habitat by minimising further clearing of the community. This requires recognition of the values of all remnants in the land use planning process, particularly development consents, rezonings and regional planning.
- Promote regeneration by avoiding prolonged or heavy grazing.
- Weed control.
- Undertake restoration including bush regeneration and revegetation.

Assuming mitigation measures are adopted, the potential impact of the Project will be significantly lessened, however the Project will result in the clearing of areas of this community. Given the lack of formal recovery plans and the community's naturally widespread distribution, it is considered unlikely that the Project would significantly interfere in the recovery of Sub-tropical Coastal Floodplain Forest.

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.*

The following key threatening process (TSC Act) that may threaten Sub-tropical Coastal Floodplain Forest is considered relevant to the Project:

- Clearing of native vegetation; the Project will require the removal of vegetation that constitutes Sub-tropical Coastal Floodplain Forest.

Conclusion

A number of measures have been recommended in **Section 7** of the Biodiversity report which aim to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2005). Sub-tropical Coastal Floodplain Forest – profile. Threatened species, populations and ecological communities of NSW. Viewed online 11/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10944

J

Appendix J Significance Impact Criteria Assessment for Threatened Flora, Fauna and Ecological Communities

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Significant Impact Criteria

1.1 Fauna

1.1.1 Australian Painted Snipe *(Rostratula australis)*

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

a) lead to a long-term decrease in the size of an important population of a species

Rostratula australis (Vulnerable, EPBC Act; Endangered, TSC Act) is a migratory or nomadic wading bird which ranges across freshwater wetland habitats of south-eastern Australia. Populations are not confined to particular areas, and it is thought that the range of this species is represents a single breeding population (DSEWPC, 2010). The species is known or predicted to occur through the Northern Rivers Catchment Management Region (DECCW, 2010) although there are no records for the region in the DECCW Atlas of NSW Wildlife. There are no identified significant sites for this species within the study area and since The Project will not impact on any important wetland areas, there is no risk of any long term impacts on this species from the project.

b) reduce the area of occupancy of an important population

The current area of occupancy of this species is thought to be about 1000km/sq (DSEWPC 2010), although the species ranges over a much larger area. No important population has been identified within the study area so the risk of reduction in the area of occupancy of such a population is low.

c) fragment an existing important population into two or more populations

Rostratula australis is a migratory or nomadic bird species which ranges widely across eastern Australia. There are no discrete populations at any sites, so there is no risk of fragmentation to any population.

d) adversely affect habitat critical to the survival of a species

No areas of critical habitat, such as significant wetlands sites, are identified within the study area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

The species has a breeding population across Australia. There are no identified breeding sites in the study area. Therefore, no disruption to any breeding cycle is anticipated.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

No significant wetland associations suitable for this species have been mapped along the transmission line route. There is no likelihood that modifications to any minor wetland areas would result in a decline in this species.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Invasive species are not considered to be a threat to populations of *Rostratula australis* (DSEWPC 2010; DECCW 2010). The Project is unlikely to result in the establishment of any invasive species that may result in a threat to this species.

h) introduce disease that may cause the species to decline, or

Introduction of a disease is not cited as a threatening process for this species ((DSEWPC 2010; DECCW 2010).

i) interfere substantially with the recovery of the species.

The following recovery options have been cited for this species (DECCW 2010):

- control foxes, feral dogs and cats;
- protect swamps from fire during burning-off or hazard reduction activities;
- protect wetlands and watercourses from pollution;
- limit the use of pesticides and other chemicals near wetlands and consider alternatives where available; and
- protect wetlands and associated marshy areas from clearing or disturbance.

The Project will generally avoid wetland environments. Safeguards against fire and escape of any pesticides and chemicals used in The Project will be implemented as part of the Environmental Management Plan. None of the proposed recovery actions for this species are in conflict with the proposed Project, nor will The Project interfere with these recovery actions.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Rostratula australis.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Rostratula australis* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 23 Nov 2010 17:56:15 +1100.

DECCW (2010) Painted Snipe – Profile.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10734

1.1.2 Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)

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

a) lead to a long-term decrease in the size of a population

Dasyurus maculatus maculatus (Endangered EPBC Act; Vulnerable TSC Act) is distributed widely but sparsely across coastal and subcoastal south-eastern Australia, including a population on the New England tablelands. The DECCW Atlas of NSW Wildlife maps numerous records of this species in and near the study area, especially in the Tenterfield area (study area west). *Dasyurus maculatus maculatus* may be present in a range of habitats, but has a preference for mature wet forest. It is considered likely to range within the study area. This species is generally a ground-dwelling, nocturnal predator (DSEWPC 2010). It is likely that The Project will involve some removal of vegetation in habitats suitable for this species, but the impacts of this on the overall size of the population are considered to be insignificant.

b) reduce the area of occupancy of the species

There are no data on the area of occupancy for this species although it is distributed over a large area in Qld, NSW and Vic, with an isolated population in Tasmania. It is considered unlikely that The Project could impact on the area of occupancy of this species.

c) fragment an existing population into two or more populations

The existing population is already fragmented. No known existing populations extend across the study area although it is possible that they do occur. The Project has some potential to fragment habitats, although a mobile species such as this would not be obstructed by the width of the study area corridor. No known existing populations will be fragmented into two or more populations by the proposed project.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of a population

Dasyurus maculatus maculatus breeds in dens during the winter months (June-August). These dens may be located in tree hollows, caves or amongst rocky outcrops. There is potential for some disruption to breeding if sites where a population was breeding were disturbed during the winter. The Project has some potential to disrupt a local breeding colony under these circumstances, although the extent of such a disruption would not affect the wider population.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in loss or modification of potential habitat for this species. These effects will be of a linear nature and will not modify habitats to the extent that they will be unavailable to the species.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Invasive weeds are not an identified threat to the survival of this species (DSEWPC 2010). The Project will result in the removal of small patches of vegetation, comprising both native and exotic species. Along much of the roadside areas, the understorey is dominated by exotic species due to ongoing disturbance. Species such as the cane toad and foxes are invasive species that are harmful to this species, but The Project will not result in a spread of these species. The Project is unlikely to result in the establishment of any additional invasive species that may result in a threat to this species.

h) introduce disease that may cause the species to decline, or

There is no mention in the relevant literature of any potential disease-based threats to this species (DSEWPC 2010).

i) interfere with the recovery of the species.

The identified threats to this species include: habitat loss and degradation; predation from foxes, dogs, etc; fire; direct killing; road mortality; cane toad poisoning; and 1080 dingo baiting. Recommended recovery options include: changes to the baiting regime; and landscape-level land and habitat management.

The Project has some potential to interfere with land or habitat management programs if they occurred within the study area, but only at a minor local scale. The Project would not interfere with the recovery of this species in relation to all other identified threats.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact on the species. As such, a referral to the Minister is not required. A number of measures are recommended in Section **7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010).

Dasyurus maculatus maculatus (SE mainland population) in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 24 Nov 2010 10:54:48 +1100.

1.1.3 Brush-tailed Rock-wallaby *(Petrogale penicillata)*

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

a) lead to a long-term decrease in the size of an important population of a species

Petrogale penicillata (Vulnerable, EPBC Act; Endangered, TSC Act) is rock-dwelling species which occurs in scattered colonies across Victoria, NSW and into southern Qld. Because *Petrogale penicillata* are specific to a particular habitat type, the colonies tend to be discrete, with little or no interaction or movement between colonies. The populations occurring in northern NSW, referred to as the Northern Evolutionary Significant Unit (ESU), form the largest group (DSEWPC 2010) and are distributed in suitable habitat across the region of study area. The DECCW Atlas of NSW Wildlife contains numerous records of this species on or close to the study area, including locations at Dumaresq and north of Tenterfield (study area west), and in areas to the west of Casino (study area east). However, The Project corridor generally avoids areas of significant *Petrogale penicillata* habitat, such as sandstone ranges, escarpments and major rocky outcrops, and any populations of this species directly affected are likely to be minor. There is considered to be no likelihood that the Project would lead to a long term decrease in any population of this species.

b) reduce the area of occupancy of an important population

The area of occupancy for *Petrogale penicillata* is not cited by DSEWPC (2010), but the Northern ESU is cited as having a population of between 10,000 and 25,000+ individuals in about 100 discrete colonies. No important populations have been identified within the study area so the risk of reduction in the area of occupancy of such a population is low.

c) fragment an existing important population into two or more populations

Petrogale penicillata is a species with a naturally fragmented distribution, due to its specialised habitat requirements. Even with vegetation disturbance associated with The Project, the principle characteristics of the habitats that this species requires (rocky environments, caves; crevices, etc) would remain. This species is highly mobile and easily able to traverse open rocky ground. Where The Project corridor crosses potential areas of habitat for this species, the risk of fragmentation of populations is considered to be low.

d) adversely affect habitat critical to the survival of a species

No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species. Habitat critical for this species, such as sandstone ranges and escarpments, would not be affected by The Project.

e) disrupt the breeding cycle of an important population

Petrogale penicillata live in family groups with a dominant male. The species apparently breeds year-round, usually in caves or rocky shelters. The Project will have little or no impact on the breeding cycle of this species, and no important populations are identified within the study area.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will not modify the habitat of *Petrogale penicillata* to any extent because it will generally avoid the sandstone ranges and escarpments which are the key habitats for this species. Even where The Project traverses rocky areas, the integrity of the habitat will largely remain intact. There is no likelihood that modifications to any minor rocky areas would result in a decline in this species.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The invasion of grassy feeding areas by weed species such as *Lantana* is thought to reduce habitat quality for this species (DSEWPC 2010). Control of weed species such as *Lantana* will be implemented as part of the management plan for this Project. With proper management, the proposed works are unlikely to result in an alteration to the existing environment such that any invasive plant species become established in the species' habitat. Invasive predators such as foxes and cats are a threat to this species, but The Project will not result in the spread of these species.

h) introduce disease that may cause the species to decline

Petrogale penicillata has been found to be susceptible to diseases such as toxoplasmosis and hydatidosis, which are thought to be related to contact with cats and sheep respectively (DSEWPC 2010). The Project will not lead to greater abundances of these introduced animals in the study area, so there is considered to be no additional risk of disease to this species from the Project activities.

i) interfere substantially with the recovery of the species, or

Identified threats to this species are cited (DSEWPC 2010) as: habitat degradation; fires; small population size; low migration; bioclimatic pressures; drought; hunting; disease; and a range of native and introduced predators and competitors.

A range of recovery options have been cited (DSEWPC 2010). Those most relevant to The Project include habitat management, control of weeds and fire management. The environmental management aims of The Project are not inconsistent with these objectives, and would not interfere with any recovery program.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Petrogale penicillata.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Petrogale penicillata* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 24 Nov 2010 15:09:47 +1100.

1.1.4 Eastern Bristlebird *(Dasyornis brachypterus)*

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

a) lead to a long-term decrease in the size of a population

Dasyornis brachypterus (Endangered EPBC Act; Endangered TSC Act) is now confined to three regional populations, one of which is located in the region of the study area. Here, it is confined to a few small populations within the regional parks network, to the north and south of the study area. There are records of this species (DECCW Atlas of NSW Wildlife) from Boonoo Boonoo, about 15 km north of the study area west. The known populations are generally well documented and repeated surveys for this species have been conducted over many years and are continuing, so the current size of populations is well known (DSEWPC 2010). The transmission line does not pass through any areas of known populations, therefore regional populations will be unaffected by the project.

b) reduce the area of occupancy of the species

The remaining population sites for this bird are already highly restricted (DSEWPC 2010). There is no evidence that the species moves between population sites, or occupies any sites within the area of influence of the project. Therefore, the risk of reduction of the area of occupancy for the species is considered remote.

c) fragment an existing population into two or more populations

The existing population is already highly fragmented. No known existing population fragments extend across the study area. Therefore, no known existing population will be fragmented by the proposed project.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of a population

No areas of known habitat for *Dasyornis brachypterus* will be affected and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

No areas of known habitat for *Dasyornis brachypterus* will be disturbed by the project and therefore the availability or quality of habitat for this species will not be affected.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Populations of this species are threatened by invasive weeds and the dieback disease caused by the pathogenic fungus *Phytophthora* (DSEWPC 2010). The Project will result in the removal of small patches of vegetation, comprising both native and exotic species. Along

much of the roadside areas, the understorey is dominated by exotic species due to ongoing disturbance. The Project is unlikely to result in the establishment of any additional invasive species that may result in a threat to this species.

h) introduce disease that may cause the species to decline, or

There is no mention in the relevant literature of any potential disease-based threats to this species (DSEWPC 2010).

i) interfere with the recovery of the species.

A specific recovery plan for this species has not been finalised. However, the defined recovery actions relevant to The Project are cited as follows (DSEWPC 2010):

- Surveys have been undertaken and continue to be undertaken at known and potential sites;
- Control measures for feral animals have been implemented at some sites;
- Critical habitat has been protected and rehabilitated through the erection of fencing;
- establishment of firebreaks and introduction of measures to remove and control the spread of noxious weeds;
- Access to some inhabited areas is restricted, open fires are prohibited in some inhabited areas, and signs have been erected to reduce the incidence of road deaths; and
- Fire management plans have been prepared and implemented and fire history mapping has been undertaken.

The following recovery actions have also been recommended:

- Protect occupied habitat on private land by land purchase or conservation agreements;
- Maintain sub-populations at all sites with more than one extant territory; and
- Map known and potential habitat.

DECCW (2010) lists additional recovery options for the NSW populations. Given the known distribution of this species, it is considered unlikely that the species would occur within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock, feral animals or invasive weeds within the study area. None of the completed or proposed recovery actions determined by Commonwealth or NSW authorities are in conflict with the proposed project, nor will the project interfere with these recovery actions.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact on the species. As such, a referral to the Minister is not required. A number of measures are recommended in Section **7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Dasyornis brachypterus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 23 Nov 2010 15:15:24 +1100

Dept. Environment Conservation Climate & Water (2010) Eastern Bristlebird – profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10206

1.1.5 Grey-headed Flying-fox (*Pteropus poliocephalus*)

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

a) lead to a long-term decrease in the size of an important population of a species

Pteropus poliocephalus (Vulnerable, EPBC Act; Vulnerable, TSC Act) is distributed through coastal and subcoastal eastern Australia, from northern Queensland to Victoria. The species is highly mobile and the national population is fluid, moving up and down the east coast in search of food. This species roosts in defined "camps" typically in emergent trees close to water. It forages widely in search of fruit and nectar; up to 50 km from the roost site. Within the Northern Rivers Catchment Management Region, it is known from 17 sub-regions and predicted to occur in 12 others (DECCW 2010). DECCW Atlas of NSW Wildlife indicates several occurrences of this species are known both within and near to the study area.

Given the widespread distribution and movements in the region, and the known occurrence of the species on and near the study area, it is likely that the Project has some potential to interface with this species. There is no evidence to suggest that an important population may be affected by the Project and no mechanism whereby the Project could lead to a long-term decrease in the size of an important population.

b) reduce the area of occupancy of an important population

The area of occupancy for this species is not cited by DSEWPC (2010) or DEWCC (2010), but national counts conducted in 2005 indicate the population may be between 425,000 and 674,000 individuals spread across three States. The primary way that a disturbance to this species could impact on its area of occupancy, would be if an established and significant roost site were to be disturbed. No such sites have been identified within the study area.

c) fragment an existing important population into two or more populations

Pteropus poliocephalus is a highly mobile species and undertakes both local and seasonal long range migrations. There is no risk that The Project could lead to fragmentation of populations in this species as any habitat loss caused by The Project would be localised and linear in nature.

d) adversely affect habitat critical to the survival of a species

No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Mating in this species occurs in early autumn, with females giving birth around October. Young are fostered in maternal camps. As there are no important populations or maternal camps affected by the proposed alignment, then the Project will not disrupt the breeding cycle of this species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The project may modify some areas of suitable foraging habitat for this species, but no important camp or maternity sites will be affected. The species is widely distributed and there is no indication that any sites within the study area are significant for this species. There is no likelihood that The Project would modify habitats to the extent that this species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

There are no identified threats to *Pteropus poliocephalus* from invasive species (DSEWPC 2010; DEWCC 2010) nor will the Project result in the spread of any invasive species.

h) introduce disease that may cause the species to decline

This species may be susceptible top Australian bat Lyssavirus, Bat Paramyxovirus and Menangle Pig virus, although these pathogens have not yet been recorded in this species (DSEWPC 2010). There is considered to be no additional risk of disease to this species from the Project activities.

i) interfere substantially with the recovery of the species, or

Identified threats to this species are cited (DSEWPC 2010) as: habitat loss; exploitation; competition with other species; pollutants and pathogens; and fragmentation of habitats. An additional threat relevant to the Project is the threat of overhead power lines, and the potential for bats to be either electrocuted or entangled in them (DECCW 2010). For bats to become electrocuted, they must touch two strands of the power line, so this threat is an issue for local power lines rather than major transmission lines, where wires are spaced widely apart. Bats can and do fly into transmission lines, although it is expected that mortality rates are low. There is some potential for interference to a recovery from this threat, but it is unlikely that such interference would be substantial.

Identified recovery actions (DECCW 2010) for this species are:

- Protect roost sites, particularly avoid disturbance September through November;
- An appropriate fire regime which protects the species from frequent fire;
- Identify and protect key foraging areas off areas supporting the species to preclude stock;
- Weed control; and
- Identify powerline blackspots and implement measures to reduce deaths.

The environmental management aims of The Project are not inconsistent with these objectives, and would not interfere with any recovery program.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Pteropus poliocephalus.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Pteropus poliocephalus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Thu, 25 Nov 2010 11:51:31 +1100.

DECCW (2910) Grey-headed Flying-fox – Profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10697

1.1.6 Hastings River Mouse (*Pseudomys oralis*)

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

a) lead to a long-term decrease in the size of a population

Pseudomys oralis (Endangered EPBC Act; Vulnerable TSC Act) is a small native rodent occurring in north-eastern NSW and south-eastern Qld. Populations are widely distributed but are restricted to areas above 500 m in elevation (DSEWPC 2010). Based on mapping data provided in the DECCW Atlas of NSW Wildlife, a population of this species is located in the range country about 20 km south of the central part of the study area. Given the altitudinal and habitat requirement of this species, and the known distribution, the most likely area where there is potential for this species to occur within the project area would be in the elevated section near Tabulam, in the study area east. The species occurs in habitats with an open canopy and a shrub layer, often associated with creeks or soakages.

This species may be present within the study area in areas of suitable habitat and elevation, although no populations are currently known within the study area. Any impacts on a species such as this would be at a local level only and the project actions would not lead to a long term decrease in the size of any population.

b) reduce the area of occupancy of the species

The area of occupancy for this species is not cited in DSEWPC (2010) or DECCW (2010), but in NSW, it is reported as “known” from 13 subregions of the Northern Rivers Catchment Management Region, and four subregions of the Hunter/Central Rivers Catchment Management Region (DECCW 2010). It is restricted in all areas to higher elevations. It is considered unlikely that The Project could impact on the area of occupancy of this species because none of the known localities occur within the study area and the Project would not disturb sufficient areas of habitat for such an impact to be relevant.

c) fragment an existing population into two or more populations

The current population is fragmented due to habitat requirements, particularly elevational requirement. Where the Project passes through potential habitat area, some vegetation clearing will take place, but a shrub layer will persist. Therefore, it is likely that microhabitat for this small terrestrial species may remain suitable for it to live or move through these areas. No known existing populations will be fragmented into two or more populations by the proposed project.

d) adversely affect habitat critical to the survival of a species

No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of a population

There are few data available on breeding in this species. *Pseudomys oralis* is reported to breed between August and March, with a litter of two to three young (DEC 2005). A population has not been identified within the study area to date and the likelihood of the project having any significant impacts on breeding in this species is considered to be remote.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in loss or modification of potential habitat for this species. These effects will be of a linear nature and will not modify habitats to the extent that they will be unavailable to the species. The possibility of a decline in the species due to project activities is remote.

f) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Invasive weeds are not an identified threat to the survival of this species although changes in the composition of native grasses/herbs caused by grazing may impact habitats. Feral cats and foxes are cited as predator threats harmful to this species DEC (2005). These species are already established in the region and the Project will not result in a spread of these species. The Project is unlikely to result in the establishment of any additional invasive species that may result in a threat to *Pseudomys oralis*.

g) introduce disease that may cause the species to decline, or

There is no mention in the relevant literature of any potential disease-based threats to this species (DSEWPC 2010; DEC 2005).

h) interfere with the recovery of the species.

The identified threats to this species include: loss of habitat through clearing; reduced groundwater and stream flow as a result of clearing or canopy reduction; cattle grazing and trampling of preferred habitat, especially close to water; too frequent fires, which may destroy or severely reduce species diversity ground cover; and predation by foxes and feral cats (DECCW 2010).

A recovery plan for this species is in effect (DEC 2005). Key elements of the recovery program include: research into genetics and populations; research into ecology and management, particularly in relation to habitat disturbance, fire, feral animals and habitat modelling; population surveys; and mapping of dispersal corridors.

The Project has some potential to interfere with land or habitat management programs if they occurred within the study area, but only at a minor local scale. The Project would not interfere with the recovery of this species in relation to all other identified threats.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact on the species. As such, a referral to the Minister is not required. A number of measures are recommended in Section **7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Pseudomys oralis* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 24 Nov 2010 19:19:45 +1100.

DECCW (2010) Hastings River Mouse – Profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10689

DEC (2005) Approved NSW and National Recovery Plan. Hastings River Mouse (*Pseudomys oralis*).

1.1.7 Long-nosed Potoroo (*Potorous tridactylus tridactylus*)

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

a) lead to a long-term decrease in the size of an important population of a species

Potorous tridactylus tridactylus (Vulnerable, EPBC Act; Vulnerable, TSC Act) is a medium sized marsupial species which is widely but sparsely distributed through south-eastern Australia, including Tas, Vic, NSW and southern Qld. The population in northern NSW and southern Qld is considered secure (DSEWPC 2010). In the region of the study area, this species has been recorded from the Cambridge Plateau (study area east) and the Bluff River area, south of Tenterfield (study area west) (DECCW Atlas of NSW Wildlife). Habitat preferences for this species in northern NSW are variable, but it generally prefers wet sclerophyll forest, coastal heaths and scrubs. Key habitat requirements are the availability of dense vegetation cover for shelter, and an abundance of fungi, the main food source. No important populations have been identified in the study area, and it is considered there is no likelihood that The Project would lead to a long term decrease in any population of this species.

b) reduce the area of occupancy of an important population

The area of occupancy for this species is not cited by DSEWPC (2010). No important populations have been identified within the study area so the risk of reduction in the area of occupancy of such a population is low.

c) fragment an existing important population into two or more populations

Populations of this species appear to be scattered and there is no evidence that a discrete population occurs within the study area. The Project has the potential to cause fragmentation of habitats where it crosses wet sclerophyll forests with dense understory, and in these areas, if populations of *Potorous tridactylus tridactylus* were present, they may be affected. However, this is a nocturnal species and would be able to traverse open areas with little difficulty. The risk of fragmentation of important populations of this species is considered to be low.

d) adversely affect habitat critical to the survival of a species

No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

This species breeds year round, and has a life span of up to 10 years. The Project will have little or no impact on the breeding cycle of this species, and no important populations are identified within the study area.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The project may modify some areas of habitat suitable for this species, but the species is widely distributed and there is no indication that any sites within the study area are significant for this species. There is no likelihood that The Project would modify habitats to the extent that this species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Invasive plant species are not an identified threat to *Potorous tridactylus tridactylus.* Predators, including foxes and cats have been identified as a threat but The Project will not result in the spread of these species and it is likely that these species are already established in the area. The Project is unlikely to result in the establishment of any additional invasive species that may result in a threat to this species.

h) introduce disease that may cause the species to decline, or

There are no identified disease threats cited for this species (DSEWPC 2010; DECCW 2010). There is considered to be no additional risk of disease to this species due to the Project activities.

i) interfere substantially with the recovery of the species.

Identified threats to this species are cited (DSEWPC 2010) as: predation by cats and foxes; residential and industrial development; and natural disasters. The Project could be considered as an industrial development, but the impacts of this project are relatively minor and spread over a long narrow corridor, rather than expanding over a discrete wide area such as would occur with more traditional industrial development. Past threats to the species also include baiting and hunting.

The primary recovery actions for this species are the establishment of conservation reserves to protect critical populations, and the baiting of foxes to reduce predator pressure. The environmental management aims of The Project are not inconsistent with these actions, and would not interfere with any recovery program.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Potorous tridactylus tridactylus.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Potorous tridactylus tridactylus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 24 Nov 2010 17:02:21 +1100.

DECCW (2010) Long-nosed Potoroo – Profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10662

1.1.8 Microbats – Large-eared Pied Bat (*Chalinolobus dwyeri*) Greater Long-eared Bat (*Nyctophilus timoriensis*) (South-eastern form)

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

a) lead to a long-term decrease in the size of an important population of a species

Chalinolobus dwyeri (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs from near Rockhampton in Queensland south to Ulladulla in NSW. DECCW records of this species exist within the study area east. The Department of Sustainability, Environment, Water, Population and Communities (2010) identifies important populations as being:

- Those present in the sandstone escarpments of the Hunter Valley, Sydney Basin and Southern Tablelands of NSW;
- Those in the sandstone escarpments of Carnarvon, Expedition Ranges and Blackdown Tablelands Queensland; and
- Those in limestone caves and caves and mines in rocks of volcanic origin in the western and north eastern parts of its range in NSW, south eastern Queensland, as well as Shoalwater Bay north of Rockhampton.

The Project area is within the north-eastern range of *Chalinolobus dwyeri* within NSW. The species is predicted to occur within the alignment east, based on habitats present. Given the existing 132kV easement and assuming recommended mitigation measures are adopted, it is considered unlikely that the Project would lead to a long-term decrease in the size of an important population of *Chalinolobus dwyeri*.

Nyctophilus timoriensis (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs from the Expedition Range and Dawson River areas of Queensland south through much of NSW into Victoria and parts of South Australia. No important populations of this species have been declared (Department of Sustainability, Environment, Water, Population and Communities, 2010; Schulz and Lumsden, 2010).

Nyctophilus timoriensis is predicted to occur within the alignment west, based on habitats present. Given that there are no declared important populations of this species, and assuming mitigation measures are adopted, the Project will not lead to a long-term decrease in the size of an important population of *Nyctophilus timoriensis*.

b) reduce the area of occupancy of an important population

Chalinolobus dwyeri is predicted to occur within the alignment east, based on habitats present, however was not found during field surveys conducted of the study area. The species seems to persist in the locality despite the existing 132kV easement. Assuming mitigation measures are adopted, it is considered unlikely that any additional disturbance associated with the Project will reduce the area of occupancy of an important population.

Nyctophilus timoriensis is predicted to occur within the alignment west based on habitats present. No important populations of this species have been declared, and mitigation measures are recommended in **Section 7** to reduce potential impacts resulting from the project. As such, it is considered unlikely that the Project would result in a reduction in the area of occupancy of an important population of this species.

c) fragment an existing important population into two or more populations

Records of *Chalinolobus dwyeri* exist more than 10km to the north and south of the eastern portion of the Project area (NSW NPWS Atlas, 2010). These records could be considered to constitute part of a declared important population of the species. However, given the presence of the existing 132kV easement within this portion of the Project area, and assuming mitigation measures are implemented, it is unlikely that the Project would fragment an existing important population into two or more populations.

Nyctophilus timoriensis is predicted to occur within the alignment west, based on habitats present. There are no declared important populations of this species. As such, assuming mitigation measures are adopted, the Project will not fragment an existing important population into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Chalinolobus dwyeri appear to mate in early winter, with nursery colonies established in September. Most males leave the colony prior to young being born in early summer. Juveniles typically leave the roost by early spring, with some roost sites abandoned during winter, and other roosts being used year round (Department of Sustainability, Environment, Water, Population and Communities, 2010). Assuming mitigation measures are implemented, it is considered unlikely that the Project would have any impact on roost sites such as caves. As such, the Project is unlikely to disrupt the breeding cycle of an important population of the species.

There is little information currently available on the life cycle of *Nyctophilus timoriensis* (Department of Sustainability, Environment, Water, Population and Communities, 2010). Given that there are no declared important populations of this species, and assuming mitigation measures are adopted, the Project will not disrupt the breeding cycle of an important population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The habitat requirements of *Chalinolobus dwyeri* habitat are not well known, however they may depend on sandstone outcrops. The species uses disused mine shafts, caves, overhangs, disused Fairy Martin (*Hirundo ariel*) nests and tree hollows for shelter and roost sites. In NSW this species has been recorded from a large range of vegetation types (Department of Sustainability, Environment, Water, Population and Communities, 2010). The Project will require the clearing of vegetation that constitutes *Chalinolobus dwyeri* habitat within the alignment east. Given the existing 132kV easement in this area. Assuming mitigation measures are adopted, the Project is considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Nyctophilus timoriensis occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands (Department of Sustainability, Environment, Water, Population and Communities, 2010). There are areas of potential habitat in the study area west, and the alignment west will require the removal of some areas of potential *Nyctophilus timoriensis* habitat. Only a small portion of the alignment west falls within potential habitat for this species, with the majority of records for this species to the west and south of the Project area (NSW NPWS Atlas, 2010). Given the small area of potential impact, and assuming mitigation measures are adopted, the Project is considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat such that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

There is a lack of information on the potential impact of invasive species on *Chalinolobus dwyeri* (Department of Sustainability, Environment, Water, Population and Communities, 2010). It is possible that predation by invasive species may be harmful to the species. Foxes, cats and dogs have all been observed within the Project area, along with European honeybees. Competition for roost sites in tree hollows may also have the potential to be

harmful to the species, with invasive bird species and European honeybees competing with *Chalinolobus dwyeri* for suitable hollows. However it is considered unlikely that the Project would result in any invasive species becoming established in *Chalinolobus dwyeri* habitat that are not already present within the Project area.

It is unknown what the impact of predation by invasive species may be on *Nyctophilus timoriensis*; however it is documented as a threat for the species (Department of Sustainability, Environment, Water, Population and Communities, 2010). Additionally, competition for tree hollows is noted to be a threat to the species, with invasive species such as the Common Starling (*Sturnus vulgaris*) known to evict bat species from tree hollows. It is considered unlikely that the Project would facilitate the establishment of any invasive species in *Nyctophilus timoriensis* habitat that are not already present within the Project area.

h) introduce disease that may cause the species to decline, or

There are no diseases listed as being relevant to *Chalinolobus dwyeri* (Department of Sustainability, Environment, Water, Population and Communities, 2010). As such, the Project is considered unlikely to introduce disease that may cause this species to decline.

Threats to *Nyctophilus timoriensis* do not include disease as there are no diseases listed as being relevant to *Nyctophilus timoriensis* (Department of Sustainability, Environment, Water, Population and Communities, 2010). As such, the Project is considered unlikely to introduce disease that may cause this species to decline.

i) interfere substantially with the recovery of the species.

A number of recovery objectives have been recommended for *Chalinolobus dwyeri* in the *Recovery plan for the large-eared pied bat Chalinolobus dwyeri* (Hoye, 2005). The following objective is relevant to the Project:

- Identify priority roost and maternity sites for protection.

Assuming mitigation measures are adopted, the Project is considered unlikely to interfere with the recover of this species.

Ten recovery objectives have been developed to aid in the recovery of Nyctophilus timoriensis as part of the *Draft National Recovery Plan for the South-eastern Long-eared Bat Nyctophilus corbeni* (Schulz and Lumsden, 2010). The following are relevant to the Project:

- Identify key populations and protect these from habitat loss and fragmentation; and
- Identify the extent of population fragmentation and instigate measures to increase habitat connectivity where recent isolation has occurred.

Based on the listed recovery objectives, the Project is considered unlikely to interfere with the recovery of the species.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Chalinolobus dwyeri* and *Nyctophilus timoriensis.* As such, a referral to the Minister has been completed; refer to **Appendix A***.* A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that

biodiversity values within the Project area are maintained or improved.

References

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1.1.9 Parrots – Double-eyed Fig-Parrot (*Cyclopsitta diophthalma coxeni*) and Swift Parrot (*Lathamus discolour*)

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Cyclopsitta diophthalma coxeni* (Endangered, EPBC Act; Critically Endangered, TSC Act) and *Lathamus discolour* (Endangered, EPBC Act; Endangered, TSC Act) are predicted to occur within the alignment based on previous records and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation from within the easement east. Given the existing 132kV easement and the dominance of agricultural and forestry activities within the area, it is considered unlikely that works associated with the Project would result in a long-term decrease in the size of a population of *Cyclopsitta diophthalma coxeni* or *Lathamus discolour.*

b) reduce the area of occupancy of the species

Cyclopsitta diophthalma coxeni is limited to about five populations scattered between Bundaberg in Queensland and the Hastings River in NSW. Given the existing 132kV easement, the species current limited distribution, and the preference of lowland subtropical rainforests it is considered unlikely that works associated with the Project would further reduce the area of occupancy of *Cyclopsitta diophthalma coxeni.*

Lathamus discolour breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW, the species mostly occurs on the coast and south west slopes. Given the species extensive natural distribution, and the presence of several known areas of occupancy along the East Coast, it is considered unlikely that works associated with the Project would reduce the area of occupancy of *Lathamus discolour.*

c) fragment an existing population into two or more populations

Cyclopsitta diophthalma coxeni and *Lathamus discolour* are considered likely to occur within the alignment based on suitable habitats present. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. Given the presence of the existing 132kV easement, it is considered unlikely that any expansion works associated with the Project would result in the fragmentation of an existing population into two or more populations, as the existing easement already fragments potential *Cyclopsitta diophthalma coxeni* and *Lathamus discolour habitat*.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region, it is considered unlikely that the Project will result in any further disruption to the breeding cycle of any population of *Cyclopsitta diophthalma coxeni. Lathamus discolour* breed in Tasmania and it is considered unlikely that the Project will have any adverse effects on this species breeding.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region and limited distribution of *Cyclopsitta diophthalma coxeni,* and *Lathamus discolour's* migratory behaviour it is considered unlikely that works associated with the Project would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

It is unclear what invasive species are harmful to *Cyclopsitta diophthalma coxeni* and *Lathamus discolour.* However these species may be impacted by more aggressive species such as Little Corella *Cacatua sanguinea,* Galah *Eolophus roseicapillus and* Common Brushtail possum *Trichosurus vulpecula* and increasing competition for hollows. It is possible that each of these invasive species already exist within the Project area.

The Project has the potential to result in disturbance to a number of sites throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of pest species becoming established in potential habitat for this species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Cyclopsitta diophthalma coxeni* and *Lathamus discolour* becoming further established in the species habitat.

h) introduce disease that may cause the species to decline, or

Cyclopsitta diophthalma coxeni and *Lathamus discolour* may be susceptible to Psittacine Beak and Feather Disease *Psittacine Circoviral* which is an infectious and potentially fatal disease that is common in Australian parrots (Department of Sustainability, Environment, Water, Population and Communities, 2010). Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the disease *Psittacine Circoviral* into all areas

associated with the Project. Provided mitigation measures are implemented, it is considered unlikely that the Project would introduce any diseases that may cause *Cyclopsitta diophthalma coxeni* and *Lathamus discolour* to decline.

i) interfere with the recovery of the species.

NSW National Parks and Wildlife Service (2002) have released a recovery plan which sets out five specific recovery actions for *Cyclopsitta diophthalma coxeni*. The following are relevant to the current project:

- Habitat assessment; and
- Habitat protection and enhancement.

The Tasmanian Department of Primary Industries, Water and Environment (2001) released a recovery plan that sets out six specific recovery objectives and five recovery actions for *Lathamus discolour*, of which the following are relevant to the current project:

Recovery objectives

- To reduce the incidence of collisions with man-made structures; and
- To quantify improvements in carrying capacity by monitoring changes in extent and quality of habitat.

Recovery actions

- Manage swift parrot habitat at a landscape scale; and
- Reduce the incidence of collisions.

Cyclopsitta diophthalma coxeni and *Lathamus discolour* are predicted to occur within the alignment east based on habitats present, in areas currently traversed by the existing 132kV easement. Given the presence of the existing 132kV easement and associated disturbances, it is considered unlikely that the Project would have a significant impact on any known populations of *Cyclopsitta diophthalma coxeni* and *Lathamus discolour*. Given the existing disturbance regimes within the alignment east, the project is not considered likely to interfere substantially with the recovery of *Cyclopsitta diophthalma coxeni* and *Lathamus discolour*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Cyclopsitta diophthalma coxeni* and *Lathamus discolour.* As such, a referral to the Minister has been completed,;refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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1.1.10 Regent Honeyeater (*Anthochaera phrygia*)

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

a) lead to a long-term decrease in the size of a population

Anthochaera phrygia (Endangered EPBC Act; Endangered TSC Act) is distributed sparsely across south-eastern Australia. There are three main breeding areas; Capertee Valley, NSW; the Bundarra-Barraba area, NSW; and around Chiltern, Victoria. The study area does not traverse these sites. There is some potential for this species to occur, at least occasionally, in the study area, as there are potentially suitable habitats and the species is either known or predicted to occur in nearby areas (DECCW 2010). In particular, there are records in the Atlas of NSW Wildlife from near the study area (west) (DECCW 2010).

It is likely that The Project will involve some removal of vegetation in habitats suitable for this species, but the impacts of this on the overall size of the population would be insignificant.

b) reduce the area of occupancy of the species

The extent of occurrence of this species is estimated at 300 000 km², with an area of occupancy estimated at 250 km² (DSEWPC 2010). It is considered unlikely that The Project could impact on the area of occupancy of this species.

c) fragment an existing population into two or more populations

The existing population is already fragmented. No known existing population fragments extend across the study area. The Project has some potential to fragment habitats, although for a highly mobile species such as *Anthochaera phrygia*, this is unlikely to be an issue. No known existing populations will be fragmented by the proposed project.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of a population

No areas of known breeding habitat for *Anthochaera phrygia* will be affected and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Some areas of potential habitat will be affected by The Project, but the effects will be of a linear nature and will not modify habitats to the extent that they will be unavailable to the species.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Invasive weeds are not an identified threat to the survival of this species (DSEWPC 2010), as its primary foraging and breeding habitat is in the canopy of larger trees. The Project will result in the removal of small patches of vegetation, comprising both native and exotic species. Along much of the roadside areas, the understorey is dominated by exotic species due to ongoing disturbance. The Project is unlikely to result in the establishment of any additional invasive species that may result in a threat to this species.

h) introduce disease that may cause the species to decline, or

There is no mention in the relevant literature of any potential disease-based threats to this species (DSEWPC 2010).

i) interfere with the recovery of the species.

A recovery plan for this species is in effect. Actions identified in the plan that are relevant to the Project are summarised below:

- Habitat management including rehabilitation and revegetation projects;
- Population monitoring, including initiation of a population monitoring program at the three main breeding areas, taking advantage of the existing sightings database and the Birds Australia Bird Atlas Project to elucidate distribution patterns and the magnitude of the range reduction over recent decades; and
- Community education and participation.

The Project has some potential to interfere with habitat management and revegetation actions in the recovery plan if these actions are planned to occur within the study area. Therefore, consultation with the *Anthochaera phrygia* recovery team will be required to ensure that no interference will occur.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact on the species. As such, a referral to the Minister is not required. A number of measures are recommended in Section **7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10841

1.1.11 Reptiles - Three-toed Snake-tooth Skink (*Coeranoscincus reticulatus*) and Border Thick-tailed Gecko (*Underwoodisaurus sphyrurus*)

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

a) lead to a long-term decrease in the size of an important population of a species

There are no declared important populations of *Coeranoscincus reticulatus* (Vulnerable, EPBC Act; Vulnerable, TSC Act) (Department of Sustainability, Environment, Water, Population and Communities, 2010). The Project will require disturbance to land within the known range of *Coeranoscincus reticulatus*, however no works will be undertaken within close proximity to locations in which the species has been recorded previously. Assuming mitigation measures are adopted, the Project will not lead to a long term decrease in the size of an important population of this species.

There are no declared important populations of *Underwoodisaurus sphyrurus* (Vulnerable, EPBC Act; Vulnerable, TSC Act) (Department of Sustainability, Environment, Water, Population and Communities, 2010). This species is predicted to occur within the western section of the Project area, based on habitats present and previous records. The project will result in disturbance within the known range of the species; however assuming mitigation measures are adopted, and given the lack of declared important populations, the Project will not result in a decrease in the size of any important population of this species.

b) reduce the area of occupancy of an important population

Coeranoscincus reticulatus occurs in the ranges and lowlands from Cooloola in south east Queensland to Grafton in north east NSW. Given the lack of records of this species within the Project area, and the lack of declared important populations, it is considered unlikely that the Project would reduce the area of occupancy of an important population of this species.

Underwoodisaurus sphyrurus is found throughout the north west slopes and northern tablelands of NSW and the Stanthorpe region of southern Queensland. Given the lack of declared important populations of this species, and their naturally patchy distribution, it is considered unlikely that the Project would reduce the area of occupancy of an important population.

c) fragment an existing important population into two or more populations

There are no declared important populations of *Coeranoscincus reticulatus*, and the majority of records of this species are located some distance from the Project area. As such, it is considered unlikely that the Project would fragment an existing important population into two or more populations.

No important populations of *Underwoodisaurus sphyrurus* have been declared. Assuming mitigation measures are adopted, and given the lack of declared important populations, it is considered unlikely that the Project would fragment an existing important population into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

There is limited information on the breeding cycle of *Coeranoscincus reticulatus*. Gravid females have been found in October to December, and one nest has been found in March, in moist soil beneath a rotten log in a rainforest gap. Given the lack of declared important populations of this species, and lack of previous records of this species within the Project area, it is unlikely that the Project would disrupt the breeding cycle of an important population.

Little is known of the breeding cycle of *Underwoodisaurus sphyrurus* (Department of Sustainability, Environment, Water, Population and Communities, 2010). Given the lack of declared important populations of this species, it is considered unlikely that the Project would disrupt the breeding cycle of an important population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Coeranoscincus reticulatus is typically found in closed forest and to a lesser extent, open *Eucalyptus* forest. This species is often found in well-mulched, loose, friable rainforest soil in leaf litter, often immediately adjacent to fallen tree trunks (Department of Sustainability, Environment, Water, Population and Communities, 2010). The Project will require the removal of some vegetation that would constitute *Coeranoscincus reticulatus* habitat. However, given the species has quite a large range, extending from Cooloola in Queensland south to Grafton, and assuming mitigation measures are adopted, it is considered unlikely that the Project would result in the modification or removal of habitat to the extent that the species would decline.

Underwoodisaurus sphyrurus utilises dry sclerophyll open forest and woodland associated with outcrops of granite, basalt, sandstone and metamorphic rocks. The majority of sites are associated with granite outcrops. Surveys conducted in north-eastern NSW indicate that geckos may show a preference for easterly aspects and the base of rock scarps. Shelter sites include rocks, decaying logs, bark, and litter in rocky rubble (Department of Sustainability, Environment, Water, Population and Communities, 2010). While the Project will require the clearing of some areas of habitat associated with this species, assuming mitigation measures are implemented, it is considered unlikely that the Project would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that *Underwoodisaurus sphyrurus* is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Department of Sustainability, Environment, Water, Population and Communities (2010) does not list any invasive species known to be harmful to *Coeranoscincus reticulatus*. However several invasive species are listed as being a threat to *Underwoodisaurus sphyrurus*, namely:

- Grazing and trampling of habitat by domestic stock and feral goats (*Capra hircus*) and
- Predation by feral cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) (Department of Sustainability, Environment, Water, Population and Communities, 2010).

It is likely that these invasive species also pose a threat to *Coeranoscincus reticulatus.*

Capra hircus, *Felis catus* and *Vulpes vulpes* are known to occur throughout the project area, and have been observed during field surveys conducted of the study area. As such, it is considered that the Project will not be responsible for the establishment of any harmful invasive species within these species habitat, as each of the potentially harmful invasive species already exists throughout the Project area.

h) introduce disease that may cause the species to decline, or

The Department of Sustainability, Environment, Water, Population and Communities (2010) does not list any diseases that are relevant to *Coeranoscincus reticulatus* or *Underwoodisaurus sphyrurus*. Rather, illegal collection and inappropriate fire regimes are considered a more serious threat. Hence it is considered unlikely that the project would introduce disease that may cause the species to decline.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for the *Coeranoscincus reticulatus*. In lieu of a formalised recovery plan, DECCW (2005) has defined several recovery actions for this species, of which the following is relevant to the Project:

- Retain and protect areas of rainforest and moist eucalypt forest.

There are no existing recovery plans for the *Underwoodisaurus sphyrurus*. In lieu of a formal recovery plan, DECCW (2005) has developed several recovery actions for this species, of which the following is relevant to the Project:

- Retain bushrock in its natural setting; and
- Retain and protect areas of rocky dry open forest and woodland from clearing, fragmentation and disturbance.

Although the Project will require the removal of areas of habitat for each of these species, mitigation measures have been recommended in **Section 7** to limit the potential impact. Assuming mitigation measures are adopted, and given the species range extends well outside of the Project area, it is unlikely that the Project will interfere substantially with the recovery of the species.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Coeranoscincus reticulatus* or *Underwoodisaurus sphyrurus.* As such, a referral to the Minister has been completed; refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Sustainability, Environment, Water, Population and Communities (2010). *Coeranoscincus reticulatus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Viewed online 18/11/2010. http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59628

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1.1.12 Murray Cod (*Maccullochella peelii peelii*)

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

a) lead to a long-term decrease in the size of an important population of a species

Maccullochella peelii peelii (Vulnerable, EPBC Act) occurs throughout the Murray-Darling Basin, with numerous records of this species within several rivers in close proximity to the Project area. Such waterways associated with the Project may be impacted by the upgrade and construction of various water crossings to facilitate the Project. There are no declared important populations of the species (Environment Australia, 2003; Threatened Species Scientific Committee, 2003; Department of Sustainability, Environment, Water, Population and Communities, 2010). Given that the majority of rivers and streams throughout the Project area are already subject to various levels of disturbance, and many are already spanned by informal and/or formal water way crossing structures, it is considered unlikely that works associated with the Project would lead to a long-term decrease in the size of an important population of the species.

b) reduce the area of occupancy of an important population

Maccullochella peelii peelii occurs throughout the Murray Darling Basin, from Queensland through to South Australia and Victoria. Given that there are no declared important populations of this species, and that the proposed works will not permanently remove habitat for the species, it is considered unlikely that the Project will reduce the area of occupancy of an important population.

c) fragment an existing important population into two or more populations

Maccullochella peelii peelii occurs throughout the Murray Darling Basin; however there are no declared important populations. Works associated with the Project will involve the upgrade and construction of various water crossings within the Project area. The majority of waterways throughout the Project area are already subject to various levels of disturbance, with many spanned by informal and/or formal waterway crossing structures, including bridges, causeways etc. Given that there are recent records of this species within waterways that are already subject to disturbance and crossings, the lack of declared important populations, and provided recommended mitigation measures are implemented, it is considered unlikely that works associated with the Project would fragment and existing important population into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

There are no declared important populations of *Maccullochella peelii peelii* (Environment Australia, 2003; Threatened Species Scientific Committee, 2003; Department of Sustainability, Environment, Water, Population and Communities, 2010).

The species migrates upstream prior to spawning in late spring and early summer. Hatching usually occurs 5 to 7 days after fertilisation, and larvae then drift downriver, prior to the juveniles settling out in suitable protected habitat (Threatened Species Scientific Committee, 2003). Given the presence of numerous existing waterway crossings within the Project area, it is considered unlikely that the upgrade or construction of any additional structures would result in the species being unable to complete any activities associated with their natural breeding

cycle. Provided mitigation measures are implemented, the Project will not disrupt the breeding cycle of any important populations of *Maccullochella peelii peelii*.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Maccullochella peelii peelii occurs in a diverse range of habitats, including clear rocky streams (such as those found in the upper western slopes of NSW), to slow flowing, turbid rivers and billabongs. Within the large range of habitats, *Maccullochella peelii peelii* is usually found near complex structural cover such as large rocks, snags, overhanging vegetation and other woody structures. The species is considered a main channel specialist as it is frequently found in river channels and larger tributaries (Department of Sustainability, Environment, Water, Population and Communities, 2010).

The Project will require the modification to, and addition of a number of waterway crossings within the Project area, many of which constitute potential *Maccullochella peelii peelii* habitat. Mitigation measures are recommended in **Section 7** to minimise any potential impacts associated with these works. Provided recommended mitigation measures are implemented, and given the existing waterway structures present throughout the Project area and surrounds, it is considered unlikely that the Project would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project has the potential to result in disturbance to a number of waterways throughout the Project area. *Maccullochella peelii peelii* may be subject to harmful impacts resulting from predation by the invasive species Plague Minnow (*Gambusia holbrooki*); however there is little information to suggest that *Gambusia holbrooki* would become established in any new waterways as a result of works associated with the Project.

Other invasive species that can impact *Maccullochella peelii peelii* habitat include: Carp (*Cyprinus carpio*), Redfin Perch (*Perca fluviatilis*) and Goldfish (*Carassius auratus*). It is possible that *Cyprinus carpio* can result in reduced numbers of *Maccullochella peelii peelii* (Department of Sustainability, Environment, Water, Population and Communities, 2010). The possible impacts of invasive species include predation, competition, habitat alteration, diseases and parasites. High densities of *Cyprinus carpio* may also reduce aquatic vegetation through their feeding habitats (Department of Sustainability, Environment, Water, Population and Communities, 2010). It is considered unlikely that the Project would create a means for any of these invasive species that have the potential to be harmful to become established in *Maccullochella peelii peelii* habitat. *Cyprinus carpio* were observed in several waterways during field surveys in the study area west, suggesting that they may already be established within the Project area.

h) introduce disease that may cause the species to decline, or

The Department of Sustainability, Environment, Water, Population and Communities (2010) notes that the "*occurrence and impact of diseases on* [*Maccullochella peelii peelii*] *is not well known, however, the major concern relates to exotic diseases carried by introduced species*". Diseases and pathogens of particular concern include:

- Epizootic Haematopoietic Necrosis virus.
- Viral Encephalopathy and Retinopathy.
- Goldfish Ulcer Disease.
- Asian Fish Tapeworm (*Bothriocephalus acheilognathis*).
- Parasitic copepod Anchorworm (*Lernaea cyprinacea*).

It is considered unlikely that works associated with the Project would result in an increase in potential exposure of *Maccullochella peelii peelii* to any of the diseases noted as being of concern to the species. Any diseases that may be carried by introduced species are unlikely to be spread by any works associated with the Project, as several species of exotic fish already exist within the locality.

i) interfere substantially with the recovery of the species.

Several management plans and strategies have been developed that aim to assist in the recovery of the *Maccullochella peelii peelii* summarised by The Department of Sustainability, Environment, Water, Population and Communities (2010):

- The Native Fish Strategy for the Murray-Darling Basin 2003–2013;
- The Action Plan for South Australian Freshwater Fishes 2009;
- Draft National Recovery Plan for the Murray Cod (incomplete); and
- The Living Murray.

A range of recovery actions are outlined in each of these documents, however none are specifically relevant to the Project. As such, the Project will not interfere substantially with the recovery of *Maccullochella peelii peelii*.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Maccullochella peelii peelii.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

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http://www.environment.gov.au/biodiversity/threatened/publications/murray-cod.html

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http://www.environment.gov.au/biodiversity/threatened/species/m-peelii-peelii.html

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1.1.13 Peppered Frog (*Litoria piperata*) and Stuttering Frog (*Mixophyes balbus*)

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

a) lead to a long-term decrease in the size of an important population of a species

The Project will require disturbance to the northern known range for *Litoria piperata* (Vulnerable, EPBC Act; Critically Endangered, TSC Act), however there will be no impact on any known *Litoria piperata* habitat. No individuals of this species were observed during field surveys conducted throughout the study area, nor has this species been recorded historically within the Project area. Given the lack of known or historical populations of this species within

the Project area, it is considered unlikely that the Project will lead to a long-term decrease in the size of any important population of *Litoria piperata*.

The Project will require disturbance approximately 6 km to the north of the known *Mixophyes balbus* (Vulnerable) range; however there will be no impact on any known *Mixophyes balbus* habitat. *Mixophyes balbus* is known to occur within Girard State Forest, approximately 6 km from the proposed Alignment and easement. Given the lack of known or historical populations of this species within the Project area, it is considered unlikely that the Project will lead to a long-term decrease in the size of any important population of *Mixophyes balbus*.

b) reduce the area of occupancy of an important population

Litoria piperata is predicted to occur in the Stanthorpe Plateau sub-region of the Northern Rivers CMA, restricted to elevations 800m ASL. Given the habitat restrictions, and lack of records from within the Project area suggest that this species is unlikely to occur within the project area, and hence, the Project will not reduce the area of occupancy of any important population of *Litoria piperata.*

Mixophyes balbus is known to occur within the Cataract, Stanthorpe and Rocky River Gorge sub-regions of the Northern Rivers CMA. This species occurs from the QLD border south to the Victorian border, along coastal ranges and within Girard State Forest. However, there are no records of this species from within the Project area. Given the lack of records from within the Project area, and the existing 132kV easement in the study area east, it is not considered likely that the Project would result in any reduction to the area of occupancy of any important populations of *Mixophyes balbus*.

c) fragment an existing important population into two or more populations

While *Litoria piperata* is predicted to occur within the Project area, there are no records of this species from within the Project area. As such, it is considered unlikely that the Project will fragment an existing important population into two or more populations.

Mixophyes balbus is known to occur to the south of the Project area. However, there are no records of this species from within the Project area itself. Given the lack of records from within the Project area, and the existing 132kV easement in the study area east, it is not considered likely that the Project will fragment an existing important population into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for either of these species.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Litoria piperata* or *Mixophyes balbus* will be cleared and therefore there should be no disruption to the breeding cycle of these species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Litoria piperata habitat includes streamside vegetation and shelter sites under rocks and fallen timber along rocky streams flowing eastward from the Tablelands, at an altitude above 800m (NSW National Parks and Wildlife Service, 2001). Within the study area the River Oak riparian woodland vegetation community may provide habitat for this species, however there are no records of this species within the Project area. Clearing a small amount of this vegetation

within the alignment is not considered likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Mixophyes balbus habitat includes rainforest, Antarctic Beech and wet sclerophyll forests. The species depends on freshwater streams and riparian vegetation for breeding and habitation (NSW Scientific Committee, 2002). These habitats are typical of much of the bushland found within the study area, particularly within the study area east, which contains the existing 132kV easement. Clearing vegetation, some of which is consistent with *Mixophyes balbus* habitat is not considered likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Litoria piperata and *Mixophyes balbus* may be harmed by the introduced species Cane Toad (*Rhinella marina*) and Plague Minnow (*Gambusia holbrooki*). It is possible that these invasive species already exist within the Project area. Each of these invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of waterways throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of invasive species becoming established in potential habitat for *Litoria piperata* or *Mixophyes balbus*.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Litoria piperata* or *Mixophyes balbus* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

Litoria piperata and *Mixophyes balbus* are both susceptible to the disease chytridiomycosis, which is typically fatal to amphibians. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the disease chytridiomycosis into all areas associated with the Project. Provided mitigation measures are implemented, it is considered unlikely that the Project would introduce any diseases that may cause *Litoria piperata* and *Mixophyes balbus* to decline.

i) interfere substantially with the recovery of the species.

Seven recovery objectives and twenty one recovery actions have been identified for *Litoria piperata* as part of the *Yellow-spotted Bell Frog (Litoria castanea) and Peppered Tree Frog (Litoria piperata) recovery plan* (NSW National Parks and Wildlife Service, 2001), of which the following are relevant to the Project:

- Encourage the location and identification of any remaining extant populations in the wild;
- Increase protection of potential habitat through community awareness and involvement; and
- Effectively protect and manage any extant populations which may be located in the future.

The Project will not interfere with any of these recovery objectives for *Litoria piperata*.

A draft recovery plan (currently on public exhibition) has been developed for *Mixophyes balbus*; *National Recovery Plan for the Stuttering Frog Mixophyes balbus* (Hunter and Gillespie, 2010). This plan outlines three recovery objectives and fifteen recovery actions for the species, of which the following are relevant to the Project:

- Implement effective hygiene protocols;
- Incorporate markers for site recognition; and
- Promote public education and awareness.

The Project is considered to be consistent with the recovery actions listed within the draft recovery plan. Given the lack of records of *Mixophyes balbus* within the Project area, and that works associated with the Project are consistent with the recovery actions, the Project is not considered likely to interfere substantially with the recovery of *Mixophyes balbus*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Litoria piperata.* As such, a referral to the Minister has been completed; refer to **Appendix A**. The proposal is not likely to significantly impact *Mixophyes balbus*. As such, a referral to the Minister is not required for this species. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

NSW National Parks and Wildlife Service (2001). Yellow-spotted Bell Frog (*Litoria castanea*) and Peppered Tree Frog (*Litoria piperata*) recovery plan. NPWS, Hurstville, NSW.

NSW Scientific Committee (2002). Final determination. Stuttering frog - endangered species listing. Viewed online 11/11/2010. http://www.environment.nsw.gov.au/determinations/StutteringFrogEndSpListing.htm

Hunter, D. and Gillespie, G.R. (2010). National Recovery Plan for the Stuttering Frog *Mixophyes balbus*. Department of Sustainability and Environment, Melbourne. Viewed online 16/11/2010. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/pubs/draft-for-comment-mixophyes-balbus.pdf

1.1.14 Giant Barred Frog (*Mixophyes iteratus*)

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Mixophyes iteratus* (Endangered, EPBC Act; Endangered, TSC Act) is predicted to occur within the alignment east, based on previous records and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation from within the easement east. Given the existing 132kV easement and the dominance of agricultural and forestry activities within the area, it is considered unlikely that works associated with the Project would result in a long-term decrease in the size of a population of *Mixophyes iteratus*.

b) reduce the area of occupancy of the species

Mixophyes iteratus occupies coastal lowland ranges, and occurs from south east Queensland to the Hawkesbury River in NSW. Within the Far North Coast, *Mixophyes iteratus* is known from the Mebbin, Nightcap Range and Richmond Range areas. In relation to the Project area, the species could be predicted to occur within the alignment east. Given the species extensive natural distribution, and the presence of several known areas of occupancy within the Far North Coast, it is considered unlikely that works associated with the Project would reduce the area of occupancy of *Mixophyes iteratus*.

c) fragment an existing population into two or more populations

Mixophyes iteratus could be predicted to occur within the alignment east, with populations known from the Mebbin, Nightcap Range and Richmond Range areas. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. Given the presence of the existing 132kV easement, it is considered unlikely that any expansion works associated with the Project would result in the fragmentation of an existing population into two or more populations, as the existing easement already fragments potential *Mixophyes iteratus* habitat.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical Habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no Critical Habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

Mixophyes iteratus breed around shallow, flowing rocky streams from late spring to summer. Females lay eggs onto moist creek banks or rocks above water level, from where tadpoles drop into the water when hatched. Tadpoles grow to a length of 80mm and take up to 14 months before undergoing metamorphosis into frogs. When not breeding, the frogs disperse hundreds of metres away from streams.

Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region, it is considered unlikely that the Project will result in any further disruption to the breeding cycle of any population of *Mixophyes iteratus*.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Mixophyes iteratus forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. The species also occurs in farmland, with populations previously found in disturbed areas with vegetated riparian strips on cattle farms and in regenerated logged areas. Many known sites where the *Mixophyes iteratus* occurs feature within the lower reaches of streams which have been affected by major disturbances such as clearing, timber harvesting and urban development in their headwaters (Department of Sustainability, Environment, Water, Population and Communities, 2010). Given this knowledge of the species ability to withstand disturbance, it is considered unlikely that works associated with the Project would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Mixophyes iteratus may be harmed by invasive species such as the Cane Toad (*Rhinella marina*) and Plague Minnow (*Gambusia holbrooki*). It is possible that each of these invasive species already exist within the Project area. Each of these invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of waterways throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Mixophyes iteratus* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

Mixophyes iteratus is susceptible to the disease chytridiomycosis, which is typically fatal to amphibians. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the disease chytridiomycosis into all areas associated with the Project. Provided mitigation measures are implemented, it is considered unlikely that the Project would introduce any diseases that may cause *Mixophyes iteratus* to decline.

i) interfere with the recovery of the species.

There are no existing recovery plans for *Mixophyes iteratus* within NSW. However, the species is covered within the *National recovery plan for Stream Frogs of South-east Queensland 2001-2005* (Hines and the South-east Queensland Threatened Frogs Recovery Team, 2002). This recovery plan sets out five specific recovery objectives and five recovery actions for this species, of which the following are relevant to the current project:

- Monitor populations;
- Protect populations and manage habitat; and
- Provide education and information.

Mixophyes iteratus is predicted to occur within the alignment east based on habitats present, in areas currently traversed by the existing 132kV easement. Given the presence of the existing 132kV easement and associated disturbances, it is considered unlikely that the Project would have a significant impact on any known populations of *Mixophyes iteratus*. Given the existing disturbance regimes within the alignment east, the project is not considered likely to interfere substantially with the recovery of *Mixophyes iteratus*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Mixophyes iteratus.* As such, a referral to the Minister has been completed; refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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Department of Sustainability, Environment, Water, Population and Communities (2010). *Mixophyes iteratus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Viewed online 15/11/2010. http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1944

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Significant Impact Criteria

1.1 Flora

1.1.1 MacNutt's Wattle (*Acacia macnuttiana*)

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

a) lead to a long-term decrease in the size of an important population of a species

There is a slight chance that the proposal may disturb habitat that may contain specimens of *Acacia macnuttiana* (Vulnerable, EPBC Act; Vulnerable, TSC Act) in the Torrington district adjacent to the Alignment West. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the species such that a local population of the species will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's alignment west avoids all mapped locations.

Since *Acacia macnuttiana* was not located along the alignment during field surveys conducted within the study area, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Acacia macnuttiana is known from five broad localities: Bald Rock National Park, Boonoo Boonoo National Park, private property south-west of Tenterfield, the Torrington district, and along the banks of Pindari Dam (DECCW, 2008). The mapped locations of these populations are remote from the Alignment West. Therefore, it is unlikely that the proposal will result in any populations being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Acacia macnuttiana* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Acacia macnuttiana* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Acacia macnuttiana*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works

are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

h) introduce disease that may cause the species to decline, or

There are no diseases known that are likely to cause *Acacia macnuttiana* to decline.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Acacia macnuttiana*. However DECCW (2005) has proposed several recovery actions for this species, relevant to the Project:

- Habitat management: Ongoing EIA - Advice to consent and planning authorities.
- Survey/Mapping and Habitat assessment.

Given the assessment and field survey undertaken as part of this report, it is considered unlikely that the species does occur within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Acacia macnuttiana.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) MacNutt's Wattle - Priority actions.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10018

DECCW (2008) *Acacia macnuttiana* - vulnerable species listing
http://www.environment.nsw.gov.au/determinations/acaciamacnuttianafd.htm

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

Department of the Environment, Water, Heritage and the Arts (2009). EPBC Act Policy Statement 1.1 Significant Impact Guidelines. Matters of National Environmental Significance. Commonwealth of Australia.

1.1.2 Ovenden's Ironbark (*Eucalyptus caleyi* subsp*. ovendenii*), Slaty Red Gum (*Eucalyptus glaucina*), Narrow-leaved Black Peppermint (*Eucalyptus nicholii*), Blackbutt Candlebark (*Eucalyptus rubida* subsp. *barbigerorum*), Wallangarra White Gum (*Eucalyptus scoparia*), Square-fruited Ironbark (*Eucalyptus tetrapleura*)

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Eucalyptus caleyi subsp. ovendenii* (Vulnerable, EPBC Act; Vulnerable, TSC Act) has been recorded as occurring in the study area, based on URS field studies conducted in the Project area. *Eucalyptus glaucina* (Vulnerable, EPBC Act;

Vulnerable, TSC Act), *Eucalyptus nicholii* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Eucalyptus rubida subsp. barbigerorum* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Eucalyptus scoparia* (Vulnerable, EPBC Act; Endangered, TSC Act) and *Eucalyptus tetrapleural* (Vulnerable, EPBC Act; Endangered, TSC Act), are considered likely to occur in the Project area, based on previous records and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. The Project therefore has the potential to result in a long-term decrease in the size of a population of each of the above species.

b) reduce the area of occupancy of an important population

Eucalyptus caleyi subsp. ovendenii is known only from a limited area west of Guyra to west of Tenterfield, north- east NSW. Localities include western Torrington National Park, where the species occasionally dominates woodland communities. This species was reported as existing within the Project area, according to a URS field survey. According to the Threatened Species Scientific Committee, no important populations were identified within the Project area (TSSC, 2008nw).

Eucalyptus glaucina is found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. No important populations were identified within the Project area (TSSC, 2008og).

Eucalyptus nicholii is found in less than 40 localities on the NSW Northern Tablelands, stretching from the Walcha-Niangala district just east of Tamworth, to just north of Glen Innes (TSSC, 2008oq). No important populations were reported within the Project area.

Eucalyptus rubida subsp. barbigerorum is restricted to scattered populations of the NSW Northern Tablelands, occurring from west of Glen Innes and Guyra, and in the Moonbi Ranges between Woolbrook and Nundle (TSSC, 2008pb). No important populations were identified within the Project area.

Eucalyptus scoparia There are only three known locations within NSW, all near Tenterfield in the far northern New England Tableland bioregion. It has been recorded from Bald Rock National Park, north-east of Tenterfield, western side of Donnybrook State Forest and Back Creek west of Donnybrook, west of Tenterfield (TSSC, 2008pd).

Eucalyptus tetrapleura is located in areas of coastal lowlands and coastal foothills in northern NSW. No important populations were identified within the Project area (TSSC, 2008ph).

c) fragment an existing important population into two or more populations

Eucalyptus caleyi subsp. ovendenii is known to exist in the area from URS field studies. *Eucalyptus glaucina, Eucalyptus nicholii, Eucalyptus rubida subsp. barbigerorum, Eucalyptus scoparia* and *Eucalyptus tetrapleura* are all likely to occur within the Project area. Due to the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to result in the fragmentation of existing populations into two or more populations. However, the aforementioned species were not identified as important populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for these species.

e) *disrupt the breeding cycle of an important population*

Little is known about the breeding cycle of the aforementioned *Eucalyptus* species. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population. It should be noted that none of the populations of these species is identified as an important population.

f) *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

Eucalyptus caleyi subsp. ovendenii is restricted in habitat to Northern NSW, from west of Guyra to west of Tenterfield. The species grows on shallow soils in dry, open grassy woodlands. Preferred altitudes are 610-820m, on granite substrates. The main threats to the species include invasion of habitat by introduced grasses, as well as clearing and fragmentation of grassy woodland habitat for agriculture, and grazing pressure (DECCWa, 2005). With this knowledge, the Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Eucalyptus glaucina is found only on the north coast of NSW and in separate districts: near Casino where it can be locally common and farther south, from Taree to Broke, west of Maitland. The species grows in grassy woodland and dry eucalypt forest and deep, moderately fertile and well-watered soils. The main threats to the species include clearing and fragmentation of habitat for agriculture and development, timber harvesting, and grazing pressure (DECCWb, 2005). Given this knowledge of the threats to this species, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Eucalyptus nicholii is common as an urban street tree and in gardens but is rarely found in the wild. Its distribution is limited to New England Tablelands of NSW, from Nundle to Tenterfield. The species is threatened by clearing and fragmentation of habitat for agriculture and grazing, destruction or disturbance due to roadside management, inappropriate fire regimes, collection of firewood, grazing by livestock, and collection of seed for horticulture (DECCWc, 2005). As a result, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Eucalyptus rubida subsp. barbigerorum usually occurs in woodland on medium or high fertility soils, often on cold flats. The main threats to this species are listed as clearing and fragmentation of woodland habitat for agriculture and development, timber collection and destruction and disturbance of habitat due to road-works (DECCWd, 2005). In the light of this information, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Eucalyptus scoparia occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. The species is found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops. The species is listed as Endangered under the *Threatened Species Act 1995* and is at risk of local extinction due to the small size of populations (DECCWe, 2005). Given this information, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Eucalyptus tetrapleura is restricted to dry or moist eucalypt forest on moderately fertile soil, often in low areas with poor drainage. Threats to the species include loss of habitat through clearing for agriculture, timber harvesting activities, road construction and maintenance, grazing by stock, and too-frequent fires (DECCWf, 2005). Given this information, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Eucalyptus caleyi subsp. ovendenii is threatened by invasive grass species, such as Coolatai Grass (DECCWa, 2005). It is possible that Coolatai Grass and other invasive grasses could exist in the Project area. *Eucalyptus glaucina* is not specifically identified as under threat by invasive species. *Eucalyptus nicholii* is not specifically identified as under threat by invasive species. *Eucalyptus rubida subsp. barbigerorum* is not specifically threatened by invasive species. *Eucalyptus scoparia* is not listed as specifically under threat by invasive species. *Eucayptus tetrapleura* is not specifically listed as threatened by invasive species.

The invasive species identified may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of areas. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for *Eucalyptus caleyi subsp. ovendenii*.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Eucalyptus caleyi subsp. ovendenii* becoming established in the species habitat.

h) introduce disease that may cause the species to decline

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Eucalyptus caleyi subsp. ovendenii, Eucalyptus glaucina, Eucalyptus nicholii, Eucalyptus rubida subsp. barbigerorum, Eucalyptus scoparia*, and *Eucalyptus tetrapleura.*

However DECCW (2005) has defined several recovery actions for each species as listed below, relevant to the Project:

Eucalyptus caleyi subsp. ovendenii

- Control feral herbivores in the range of the species.
- Research the ecological fire requirements of this species and use this information to develop ecological burning regimes and protective fire management strategies.
- Target priority weeds (especially Coolatai Grass)

Eucalyptus glaucina

- Maintain external populations in botanic gardens and nurseries.
- Liaise with landowners over management of populations of *Eucalyptus glaucina.*
- Avoid frequent fire that may suppress regeneration.

- Prepare Environmental Impact Assessment guidelines.
- Manage habitat clearing, loss or fragmentation.
- Limit grazing in known stands of *Eucalyptus glaucina* to enhance regeneration.
- Consider VCA or similar agreement for populations on private land.
- Monitor population size, habitat condition and threats at known sites with large populations.
- Assess implementation and effectiveness of forestry management prescriptions.
- Determine current population size and demography.
- Map extent of known populations.

Eucalyptus nicholii

- Only buy seed from appropriately licensed dealers.
- Only buy plants from appropriately licensed nurseries.
- Support local Landcare groups.
- Manage fire to promote regeneration.
- Practice sustainable grazing in areas of habitat and protect regenerating trees from grazing stock.
- Limit firewood collection in areas of habitat.
- Identify roadside populations and protect during road-works.
- Protect dry grassy woodland from clearing and fragmentation.

Eucalyptus rubida subsp. barbigerorum

- Support local Landcare groups.
- Identify roadside and easement populations and protect during road-works.
- Protect known populations and areas of potential habitat from clearing and timber collection.
- Rehabilitate disturbed areas of habitat.

Eucalyptus scoparia

- Support local Landcare groups.
- Stay on established tracks when visiting national parks.
- Protect known populations and areas of potential habitat from clearing and timber collection.
- Rehabilitate and protect disturbed areas of habitat.
- Notify the DEC of any new records of *Eucalyptus scoparia* in NSW.

Eucalyptus tetrapleura

- Avoid frequent fire in areas of known habitat.
- Exclude stock by fencing habitat.
- Identify and protect populations in timber harvesting areas and along roadsides.
- Protect habitat from further clearing.
- Assist regeneration of habitat around isolated trees

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of the above species.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact Eucalyptus caleyi subsp. ovendenii, Eucalyptus glaucina, *Eucalyptus nicholii, Eucalyptus rubida subsp. barbigerorum,* Eucalyptus scoparia, and Eucalyptus tetrapleura. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005a) Threatened species - *Eucalyptus caleyi subsp. ovendenii*. Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10286

Department of Climate Change and Water (2005b) Threatened species - *Eucalyptus glaucina.* Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10295

Department of Climate Change and Water (2005c) Threatened species – *Eucalyptus nicholii.* Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10302

Department of Climate Change and Water (2005d) Threatened species - *Eucalyptus rubida subsp. barbigerorum.* Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10812

Department of Climate Change and Water (2005e) Threatened species - *Eucalyptus scoparia.* Viewed online 25/11/2010

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10315

Department of Climate Change and Water (2005e) Threatened species - *Eucalyptus tetrapleura.* Viewed online 25/11/2010

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10319

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 24/11/2010
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

Threatened Species Scientific Committee (2008nw). *Commonwealth Conservation Advice on* Eucalyptus caleyi subsp. ovendenii. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 24/11/2010

http://www.environment.gov.au/biodiversity/threatened/species/pubs/56193-conservation-advice.pdf

Threatened Species Scientific Committee (2008og). *Commonwealth Conservation Advice on* Eucalyptus glaucina. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 24/11/2010.

http://www.environment.gov.au/biodiversity/threatened/species/pubs/5670-conservation-advice.pdf

Threatened Species Scientific Committee (2008oq). *Commonwealth Conservation Advice on* Eucalyptus nicholii. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 24/11/2010.

http://www.environment.gov.au/biodiversity/threatened/species/pubs/20992-conservation-advice.pdf.

Threatened Species Scientific Committee (2008pb). *Commonwealth Conservation Advice on* Eucalyptus rubida subsp. barbigerorum. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 24/11/2010 http://www.environment.gov.au/biodiversity/threatened/species/pubs/64618-conservation-advice.pdf.

Threatened Species Scientific Committee (2008pd). *Commonwealth Conservation Advice on* Eucalyptus scoparia. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 25/11/2010 http://www.environment.gov.au/biodiversity/threatened/species/pubs/9640-conservation-advice.pdf.

Threatened Species Scientific Committee (2008ph). *Commonwealth Conservation Advice on* Eucalyptus tetrapleura. [Online]. Department of the Environment, Water, Heritage and the Arts. Viewed online 25/11/2010 http://www.environment.gov.au/biodiversity/threatened/species/pubs/7490-conservation-advice.pdf.

1.1.3 Granite Boronia (*Boronia granitica*)

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

a) lead to a long-term decrease in the size of an important population of a species

Boronia granitica (Endangered, EPBC Act; Vulnerable, TSC Act) occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland (DECCW, 2005). The Atlas of NSW Wildlife (DECCW, 2010) shows a *Boronia granitica* population within the Torrington State Recreation Area to the south and south-east of the western extent of the Alignment West. As no individuals were identified in and around the study area, and the known locations are remote from the Alignment West, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since *Boronia granitica* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Boronia granitica* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Boronia granitica*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Boronia granitica* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Boronia granitica* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Boronia granitica*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). Invasive species are not listed as a threat within the species' National Recovery Plan (NSWNPWS, 2002).

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Boronia granitica* habitat through construction activities. The National Recovery Plan for *Boronia granitica* does not identify disease as a threat to the species' survival (NSWNPWS, 2002).

i) interfere substantially with the recovery of the species.

A National Recovery Plan has been prepared for *Boronia granitica* (NSW NPWS, 2002). The Recovery Plan identifies six broad actions (detailed further in the Plan) to assist in the recovery of this species. Those relevant to the Project are:

- Manage current reserved areas.
- Manage the Torrington State Recreation Area population.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Boronia granitica.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) Granite Boronia – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10098

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

NSW NPWS (2002) National Recovery Plan for *Boronia granitica* (Granite Boronia). NSW National Parks and Wildlife Service. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/b-granitica/index.html

1.1.4 Ooline (*Cadellia pentastylis*)

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

a) lead to a long-term decrease in the size of an important population of a species

Cadellia pentastylis (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs along the western edge of the North West Slopes north from the Gunnedah area to west of Tenterfield, and extends into Queensland to Carnarvon Range and Callide Valley (DEWHA, 2008). The Atlas of NSW Wildlife (DECCW, 2010) shows *Cadellia pentastylis* populations occurring within scattered locations, including the Mole River locality and Tenterfield area south and south-east of the Alignment West. Scattered populations also exist to the north of the Alignment West near Tenterfield Creek. The species was identified at two properties both previously noted by DECCW within the Mole River locality. Given that these populations are remote from the Alignment West, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since the populations of *Cadellia pentastylis* located along the alignment during REF survey efforts are not within the Project area, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the location and relative remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Cadellia pentastylis* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Cadellia pentastylis*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Cadellia pentastylis* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Cadellia pentastylis* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Cadellia pentastylis*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). However, invasive species such as *Opuntia aurantiaca* (tiger pear) are listed as a threat within the species' Approved Conservation Advice and will need to be considered during the Project (DEWHA, 2008).

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Cadellia pentastylis* habitat through construction activities. The Approved Conservation Advice for *Cadellia pentastylis* does not identify disease as a threat to the species' survival (DEWHA, 2008).

i) interfere substantially with the recovery of the species.

There is no recovery plan currently in place for *Cadellia pentastylis,* however the DECC recommends the following actions to assist in the recovery of this species (DECC, 2005). These are:

- Support local Landcare groups.
- Assist with the control of feral goats in habitat areas.
- Protect populations and areas of potential habitat from frequent fire.
- Protect populations and habitat areas from grazing stock.
- Identify roadside populations and areas of habitat and protect during road maintenance works.
- Assist with the control weeds in habitat areas.
- Protect populations and areas of potential habitat from clearing or disturbance.
- Expand and reconnect isolated remnants of habitat.
- Enter into conservation agreements to protect Ooline populations.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Cadellia pentastylis.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) Ooline – Profile. Available from: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10118

DECCW (2010) NPWS – Atlas of NSW Wildlife. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

DEWHA (2008) Threatened Species Scientific Committee. *Commonwealth Conservation Advice on* Cadellia pentastylis *(Ooline).* Online. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/9828-conservation-advice.pdf

1.1.5 Finger Panic Grass (*Digitaria porrecta*)

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

a) lead to a long-term decrease in the size of an important population of a species

Digitaria porrecta (Endangered, EPBC Act; Endangered, TSC Act) occurs in NSW and Queensland. In NSW it is found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran (DECCW, 2005). The Atlas of NSW Wildlife (DECCW, 2010) has the closest mapped *Digitaria porrecta* populations in the Inverell district, located approximately 117km to the south-west of Tenterfield. These records are remote enough from the Alignment West that the likelihood of presence is extremely low. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the species such that the local population of the species will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since *Digitaria porrecta* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Digitaria porrecta* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Digitaria porrecta*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Digitaria porrecta* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Digitaria porrecta* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Digitaria porrecta*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

h) introduce disease that may cause the species to decline, or

There are no diseases known that are likely to cause *Digitaria porrecta* to decline.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Digitaria porrecta*. However DECCW (2005) has proposed priority actions for this species relevant to the Project:

- Conduct targeted surveys in potential habitat.
- Conduct weed control, especially of invasive exotic grasses.
- Ensure DECC is advised of any consents or approvals that affect the species.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species does occur within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Digitaria porrecta.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005a) *Digitaria porrecta* – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10222

DECCW (2005b) *Digitaria porrecta* - Priority Actions.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Shrubs&kingdom=Plant

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.6 Hairy Jointgrass (*Arthraxon hispidus*) and Bluegrass (*Dichanthium setosum*)

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

a) lead to a long-term decrease in the size of an important population of a species

Arthraxon hispidus (Vulnerable, EPBC Act; Vulnerable, TSC Act) has been recorded over a wide area in northern NSW from a variety of habitat types. It is found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (DECCW, 2005a). The Atlas of NSW Wildlife (DECCW, 2010) has mapped *Arthraxon hispidus* in the Kyogle district to the north of the Alignment East. Although these records are remote from the Alignment East, the alignment traverses areas that may contain habitat for *Arthraxon hispidus.* However, given that the Alignment East utilises an existing cleared easement and traverses mostly disturbed land, it is unlikely that the proposal would impact on important populations of this species. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the size of the species such that the local population of the species will be placed at risk of extinction.

Within NSW, *Dichanthium setosum* (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30 km east of Guyra (approximately 165km to the south of the western extremity of Alignment West). It is associated with heavy basaltic black soils and stony red-brown hardsetting loam with clay subsoil and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture (DSEWPC, 2008). Within the vicinity of the proposal, *Dichanthium setosum* has been mapped to the north of Alignment East on the western side of the Clarence River near Tabulam (DECCW, 2010). Field surveys conducted of the study area also determined this species from west of Tenterfield, in close proximity to Reedy Creek near the Riverton locality within the proposed easement on Alignment West. Given the remoteness of known populations from the proposal, it is unlikely that proposed actions will result in a long-term increase in an important population of *Dichanthium setosum.* The populations identified during the field assessments are not considered to be important populations.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment East avoids all mapped locations. Since *Arthraxon hispidus* was not located along the alignment during field survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

The proposal will not impact on known mapped populations of *Dichanthium setosum.* The Alignment West will impact on a small population of *Dichanthium setosum.* The proposal will therefore not reduce the occupancy of an important population of this species

c) fragment an existing important population into two or more populations

Arthraxon hispidus is known from a number of in the Kyogle district to the north of the Alignment East (DECCW, 2010). The mapped locations of these populations are remote from the Alignment East. Therefore, it is unlikely that the proposal will result in any populations being fragmented.

The population of *Dichanthium setosum* recorded from the Alignment West does not constitute an important population. As other known populations will not be impacted, the proposal will not fragment important populations into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Arthraxon hispidus* or *Dichanthium setosum*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Arthraxon hispidus* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

The population of *Dichanthium setosum* recorded from the Alignment West does not constitute an important population and therefore the proposal will not disrupt the breeding cycle of an important population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Arthraxon hispidus* are remote from the proposed Alignment East, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

Core habitat areas for *Dichanthium setosum* occur chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30km east of Guyra. The proposal will therefore not impact on the quality of habitat such that the species will decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Arthraxon hispidus*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

The Approved Conservation Advice for *Dichanthium setosum* (DSEWPC, 2008) notes that the main identified threats to the species include invasion by introduced grasses such as Coolatai grass (*Hyparrhenia hirta*), Lippia (*Phyla canescens*) and African Lovegrass (*Eragrostis curvula*). The implementation of strict weed hygiene measures during construction will ensure that the risk of such exotic grasses being introduced is low.

h) introduce disease that may cause the species to decline, or

There are no diseases known that are likely to cause *Arthraxon hispidus* to decline.

There are no diseases known that are likely to cause *Dichanthium setosum* to decline

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Arthraxon hispidus*. However DECCW (2005) has proposed priority actions for this species, of which the following is relevant to the Project:

- Control Feral animals in known habitat for this species.

Given the assessment and field survey undertaken as part of this report, it is considered unlikely that the species does occur within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within

the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

There are no existing recovery plans for *Dichanthium setosum*. However DECCW (2005) has proposed several priority actions for this species, relevant to the Project:

- Clearly identify roadside populations and ensure no impact by road maintenance. (Medium priority);
- Conduct weed control, especially of invasive exotic grasses.
- Determine appropriate burning regimes and incorporate into fire management plans and park management plans.
- Discourage fertilizer drift into populations.
- Fence sites with high density populations to prevent grazing.

The field survey undertaken as part of this report confirmed the presence of *Dichanthium setosum* within the easement west of Tenterfield. As such there will be impacts to a small population of this species. Given the small area of disturbance, it is not expected that the recovery of this species will be impeded significantly. In addition, the proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. Environmental planning during construction will ensure that impacts are minimised to this species as far as practicable.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Arthraxon hispidus* or *Dichanthium setosum.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005a) *Arthraxon hispidus* – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10066

DECCW (2005b) *Arthraxon hispidus* - Priority Actions.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Shrubs&kingdom=Plant

DECCW (2005c) *Dichanthium setosum* – Priority Actions
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Herbs+and+Forbs&kingdom=Plant

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

DSEWPC (2008) Approved Conservation Advice for *Dichanthium setosum*. http://www.environment.gov.au/biodiversity/threatened/species/pubs/14159-conservation-advice.pdf

1.1.7 Torrington Pea (*Almaleea cambagei*)

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

a) lead to a long-term decrease in the size of an important population of a species

The Atlas of NSW Wildlife (DECCW, 2010) has mapped *Almaleea cambagei* (Vulnerable, EPBC Act; Endangered, TSC Act) within Torrington State Recreation Park (TSRP). The records are located a significant distance from the western extent of the Alignment West. Despite the remoteness from known records, there is a slight chance that the proposal may disturb habitat that may contain specimens of *Almaleea cambagei* beyond the boundary of the TSRP in the Torrington district adjacent to the Alignment West. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the size of the species such that the local population of the species will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations.

Since *Almaleea cambagei* was not located along the alignment during field survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Almaleea cambagei is known from three localities, near Torrington and Glencoe in the Northern Tablelands of NSW, and in the Wallangara region of southern Queensland (DSEWPC, 2008). The mapped locations of these populations are remote from the Alignment West. Therefore, it is unlikely that the proposal will result in any populations being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Almaleea cambagei* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Almaleea cambagei* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Almaleea cambagei*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

h) introduce disease that may cause the species to decline, or

There are no diseases known that are likely to cause *Almaleea cambagei* to decline.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans *Almaleea cambagei*. However DECCW (2005) has proposed a number of priority actions for this species relevant to the Project:

- Control feral pigs in suitable *Almaleea cambagei* habitat.
- Identify and avoid populations on road/track sides during roadworks.
- Prevent clearing and draining of wet heath areas that provide potential habitat for *Almaleea cambagei*.
- Survey areas of suitable habitat for *Almaleea cambagei* in areas adjacent to known populations.

Given the assessment and field survey undertaken as part of this report, it is considered unlikely that the species does occur within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Almaleea cambagei.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) *Almaleea cambagei* - Priority actions. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Shrubs&kingdom=Plant

DECCW (2010) NPWS – Atlas of NSW Wildlife. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

DSEWPC (2008) Approved Conservation Advice for *Almaleea cambagei*. http://www.environment.gov.au/biodiversity/threatened/species/pubs/56308-conservation-advice.pdf

1.1.8 Narrow Goodenia (*Goodenia macbarronii*), Tall Knotweed (*Persicaria elatior*), Heath Wrinklewort (*Rutidosis heterogama*) and Austral Toadflax (*Thesium australe*)

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Goodenia macbarronii* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Persicaria elatior* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Rutidosis heterogama* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Thesium australe* (Vulnerable, EPBC Act; Vulnerable, TSC Act) are likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present.

The Project may result in the clearing of potential habitat in the form of vegetation. Given the distribution of the above listed species, the Project has the potential to result in a long-term decrease in the size of a population of *Persicaria elatior, Rutidosis heterogama* and *Thesium australe*. However, the Project is unlikely to have a long-term impact on the size of a population of *Goodenia macbarronii* as discussed below.

b) reduce the area of occupancy of an important population

Goodenia macbarronii occurs on the western slopes of the Great Dividing Range in NSW. It is widely distributed throughout the tablelands, western slopes and western plains. The species is also distributed throughout north-east Victoria and the Darling Downs in Queensland. This species has also been identified as likely to occur within the Project area. Given the species wide distribution including NSW, Queensland and Victoria, it is unlikely that the works associated with the Project would result in a long-term decrease in the size of a population of *Goodenia macbarronii.*

Persicaria elatior is known to occur in south-eastern NSW (Moruya State Forest, Upper Avon River north of Robertson, Bermagui and Picton Lakes) northern NSW (Raymond Terrace and the Grafton area) and Queensland. This species has also been identified as likely to occur within the Project area. Given the scattered nature of this species, the works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Persicaria elatior.*

Rutidosis heterogama is located between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. This species has also been identified as likely to occur within the Project area. Give the scattered nature of this species the works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Rutidosis heterogama.*

Thesium australe occurs in small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. This species is also present in Tasmania, Queensland and in eastern Asia. Give the scattered nature of this species and its small populations, the works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Thesium australe.*

c) fragment an existing important population into two or more populations

All of the above species are considered likely to occur within the Project area. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. However, as the exact locations of the above species are not known, it is difficult to determine whether the Project would result in the fragmentation of existing populations into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Goodenia macbarronii is described as a short-lived annual herb, flowering from October to March. The flowers are insect pollinated. It has been documented that the mucilaginous wing or rim of the seed may be a mechanism for absorbing water to secure germination and coincidentally a dispersal temptation for ants. Without knowing the exact location of this species within the Project area, it is difficult to determine if the Project will disrupt the breeding cycle of this population.

Little is known about the breeding cycle of *Persicaria elatior*. Its tiny flowers are in long, narrow spikes to 5 cm long. The pink flower-segments are less than 4mm long. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

Rutidosis heterogama has bright yellow daisy heads up to 2 cm wide. Little is known about the breeding cycle of this species. Without further information it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

The flowers of the *Thesium australe* are minute and white and appear in spring. The fruit is small and nut-like, developing in summer. Little is known about the breeding cycle of this species. Without further information it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Goodenia macbarronii is an annual species, appearing seasonally and opportunistically in ephemerally damp or wet sites. It favours moist, shaded, sandy sites, soils with impeded drainage, damp muddy areas, spring-fed paddocks and open areas where water is more available. This species is also found in areas with some form of recent disturbance. The main threats to the survival of this species include stock grazing and trampling which may damage swamp habitat, vehicle disturbance, road grading and grazing along roadside stock routes and weed infestation. This species is also vulnerable to seasonal conditions as it appears opportunistically after rain periods in damp soils. Given this knowledge of the species current habitat, its opportunistic nature and distribution, this Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Persicaria elatior occurs in damp places, particularly beside streams and lakes. It is also found occasionally in swamp forest or associated with disturbance. The main threats to the survival of this species include inadvertent clearing, damage to road and track populations through maintenance activities and clearing of or hydrological changes to wetland vegetation. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Rutidosis heterogama grows in heath on sandy soils and moist areas in open forest. This species has also been recorded along disturbed roadsides. The key threats to the survival of this species include habitat loss and fragmentation, frequent fire, trampling or picking by visitors, roadside management and risk of local extinction due to low numbers. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Thesium australe occurs in grassland or grassy woodland. It is found in damp sites in association with Kangaroo Grass (*Themeda australis*) and is often hidden amongst grasses and herbs. The main threats to the survival of this species are loss and degradation of habitat as a result of development, intensification of grazing regimes, weed infestation and road works. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infestation has been identified as a threat to *Goodenia macbarronii and Thesium australe*. It is possible that invasive species already exist within the Project area. Invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of areas. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for *Goodenia macbarronii and Thesium australe*.

Weed infestation has not been identified as a major threat to *Persicaria elatior*, *Rutidosis heterogama.*

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to the above species becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for the above species. However DECCW (2005) has defined several recovery actions for each species.

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of *Persicaria elatior*, *Rutidosis heterogama* and *Thesium australe*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Persicaria elatior*, *Rutidosis heterogama* and *Thesium australe.* As such, a referral to the Minister is has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Goodenia macbarronii.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species - *Goodenia macbarronii*. Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10354

Department of Climate Change and Water (2005) Threatened species - *Persicaria elatior.* Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10590

Department of Climate Change and Water (2005) Threatened species - *Rutidosis heterogama.* Viewed online 25/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10737

Department of Climate Change and Water (2005) Threatened species - *Thesium australe.* Viewed online 25/11/2010 http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10802

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Report.

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010 http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.9 Native Jute (*Corchorus cunninghamii*)

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Corchorus cunninghamii* (Endangered, EPBC Act; Endangered, TSC Act) is considered likely to occur based on previous records. Given the existing 132kV easement and the dominance of agricultural and forestry activities within the area, it is considered unlikely that works associated with the Project would result in a long-term decrease in the size of a population of *Corchorus cunninghamii*.

b) reduce the area of occupancy of the species

Corchorus cunninghamii occurs from Richmond River in north east NSW to the Brisbane River in Queensland. Four distinct populations occur within Queensland between the Beenleigh district and the lower Brisbane River. *Corchorus cunninghamii* has been recorded in NSW from foothill and range country north of the Richmond River between Lismore, Toonumbar and Mt Lindsay near the Queensland border. It has also been listed as likely to occur within the Project area (EPBC Act Protected Matters Report, 2010). Given the species known populations in the NSW and QLD, it is considered unlikely that works associated with the Project would result in a long-term decrease in the size of a population of *Corchorus cunninghamii*.

c) fragment an existing population into two or more populations

The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement within the alignment east. It is considered likely that any expansion works associated with the Project would result in the fragmentation of an existing population into two or more populations, as the existing easement may already fragment potential *Corchorus cunninghamii* habitat.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

There is little known information on the breeding system of *Corchorus cunninghamii.* Flowers appear to be pollinated by Honey Bees (*Apis mellifera*), native bees (*Trigona sp*.) and sand wasps (*Bembix sp*.) This species has a relatively short lifespan (of up to three or four years). Reproduction occurs by seed only. Seeds are released in a dormant state which can be broken by disturbances such as fires or physical disturbance.

Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region, it is considered unlikely that the Project will result in further disruption to the breeding system of any population of *Corchorus cunninghamii*.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Corchorus cunninghamii occurs primarily in open forest in Queensland and tall wet sclerophyll forest and hoop line plantations in NSW. It occurs at low to mid elevation (150-450m) and may have originally extended to footslopes near the Richmond floodplain, which are now largely cleared. The Queensland sites have a similar topography with occupancy in hilly to steep country at altitudes of 140-350m. The major form of natural disturbance is from fire. Soil disturbance relating to human activities can stimulate germination of species. Thinning operations association with forestry activities can have a positive impact on *Corchorus cunninghamii.* Response in relation to other forestry activities is unknown.

Given this knowledge of the species current habitat, it is considered likely that works associated with the Project would not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Corchorus cunninghamii may be threatened by invasive species such as Lantana (*Lantana camara*), Crofton Weed (*Ageratina adenophorum*) and Mist Flower (*Ageratina riparia*). These species threaten to displace populations of *Corchorus cunninghamii* by competition, smothering and habitat alteration. It is possible that each of these invasive species already exist within the Project area. Each of these invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of waterways throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Corchorus cunninghamii* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

It is considered unlikely that the Project would introduce any diseases that may cause *Corchorus cunninghamii* to decline. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the diseases into all areas associated with the Project.

i) interfere with the recovery of the species.

The draft NSW and National Recovery Plan for the *Corchorus cunninghamii* was developed in November 2004. This recovery plan considers the conservation requirements of the species within its known range across NSW and identifies the actions to be taken to ensure the long-term viability of *Corchorus cunninghamii* in nature and the parties who will undertake these actions.

It is likely that *Corchorus cunninghamii* currently exists in the Project area based on previous research. Given the presence of the existing 132kV easement and associated disturbances, the Project may have a significant impact on populations of *Corchorus cunninghamii* if they exist within the Project area. Given the existing disturbance regimes, the project is may interfere with the recovery of *Corchorus cunninghamii*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact *Corchorus cunninghamii*. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Environment and Conservation (NSW) (2004) Draft NSW and National Recovery Plan *Corchorus cunninghamii* November 2004. Viewed online 23/11/2010 http://www.environment.nsw.gov.au/resources/nature/recoveryplanDraftCorchorusCunninghamii.pdf

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

Department of Climate Change and Water (2005) Threatened species. Viewed online 23/11/2010. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10177

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Tool. Viewed online 23/11/2010. http://www.environment.gov.au/erin/ert/epbc/index.html

1.1.10 Black-clubbed Spider-orchid (*Caladenia atroclavia*)

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

a) lead to a long-term decrease in the size of an important population of a species

Caladenia atroclavia (Endangered, EPBC Act; Not Listed, TSC Act) is known from four populations, three in Girraween National Park and one in the Wyberba area of the Darling Downs, south-east Queensland (DSEWPC, 2008). As all populations are within the Queensland, they are located a significant distance from the Alignment and therefore it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of *Caladenia atroclavia* are remote from the Alignment by a significant distance. Since *Caladenia atroclavia* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of the nearest records from the Alignment, it is unlikely that the proposal will result in any populations of *Caladenia atroclavia* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Caladenia atroclavia.*

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Caladenia atroclavia* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the nearest known locations of *Caladenia atroclavia* are remote from the proposed Alignment, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the nearest known locations of *Caladenia atroclavia*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species.

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Caladenia atroclavia* habitat through construction activities.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Caladenia atroclavia*. DSEWPC (2008) has listed a number of priority actions for this species:

- Design and implement a management plan for the prevention of illegal removal of *C. atroclavia*;
- Monitor known populations to identify key threats;
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary;
- Identify populations of high conservation priority;
- Ensure development activities involving substrate or vegetation disturbance in areas where *C. atroclavia* occurs do not adversely impact on known populations;
- Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure;
- Control access routes to suitably constrain public access to known sites on public land; Suitably control and manage access on private land
- Minimise adverse impacts from land use at known sites;
- Develop and implement a management plan for the control of invasive weeds in the local region;
- Identify and remove weeds in the local area, which could become a threat to *C. atroclavia,* using appropriate methods;
- Manage sites to prevent introduction of invasive weeds, which could become a threat to *C. atroclavia*, using appropriate methods
- Develop and implement a management plan for the control and eradication of feral pigs in the local region and reserve areas;

- Develop and implement a suitable fire management strategy for *C. atroclavia*;
- Identify appropriate intensity and interval of fire to promote seed germination and vegetation regeneration;
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigative measures in bush fire risk management plans, risk register and/or operation maps;
- Undertake appropriate seed collection and storage;
- Investigate options for linking, enhancing or establishing additional populations; and
- Implement appropriate national translocation protocols if establishing additional populations is considered necessary and feasible.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Caladenia atroclavia.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DSEWPC (2008) Approved Conservation Advice for *Caladenia atroclavia*. http://www.environment.gov.au/biodiversity/threatened/species/pubs/76219-conservation-advice.pdf

Department of the Environment, Water, Heritage and the Arts (2009). EPBC Act Policy Statement 1.1 Significant Impact Guidelines. Matters of National Environmental Significance. Commonwealth of Australia

1.1.11 Leafless Tongue-orchid (*Cryptostylis hunteriana*) and Hartman's Sarcochilus (*Sarcochilus hartmannii*)

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

a) lead to a long-term decrease in the size of an important population of a species

Cryptostylis hunteriana (Vulnerable, EPBC Act; Vulnerable, TSC Act) has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost (DECCW, 2005a). The Atlas of NSW Wildlife (DECCW, 2010) shows the nearest *Cryptostylis hunteriana* populations to the proposal are located within Washpool National Park, approximately 60km south of the easement. As no individuals were identified in and around the study area, and the known locations are remote from the Alignment, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Sarcochilus hartmannii (Vulnerable, EPBC Act; Vulnerable, TSC Act) is found from the Richmond River in northern NSW to Gympie in south-east Queensland (DECCW, 2005b). The Atlas of NSW Wildlife (DECCW, 2010) shows the nearest mapped locations are in the Kyogle district to the north of Lismore. As all mapped populations are located at a distance from the proposed Alignment East, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of *Cryptostylis hunteriana* have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment avoids the nearest mapped locations by a significant distance. Since *Cryptostylis hunteriana* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

Sarcochilus hartmannii populations are located a significant distance from the Alignment East. Since *Sarcochilus hartmannii* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of the nearest records from the Alignment, it is unlikely that the proposal will result in any populations of *Cryptostylis hunteriana* being fragmented.

Given the remoteness of current records from the Alignment East, it is unlikely that the proposal will result in any populations of *Sarcochilus hartmannii* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Cryptostylis hunteriana.* And *Sarcochilus hartmannii.*

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Cryptostylis hunteriana* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Sarcochilus hartmannii* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the nearest known locations of *Cryptostylis hunteriana* are remote from the proposed Alignment, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

The known habitat of *Sarcochilus hartmannii* is remote from the proposed Alignment East. The proposal is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the nearest known locations of *Cryptostylis hunteriana*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010).

Crofton weed (*Ageratina adenophora*) and mistflower (*Ageratina riparia*) are noted threats to *Sarcochilus hartmannii* (DECCW, 2005b). Given the remoteness of known populations of *Sarcochilus hartmannii* from the Alignment East, it is unlikely that the proposed works will result in the establishment of these invasive species.

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Cryptostylis hunteriana* habitat through construction activities.

Given the remoteness of known populations of *Sarcochilus hartmannii* from the proposed easement, it is highly unlikely that diseases would be introduced into its habitat through construction activities.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Cryptostylis hunteriana*. DECCW (2005a) has listed four priority actions for this species:

- Protection of key populations that in any one year have more than 20 individuals;
- Prepare plans of management for development sites (incl. Callala Bay) where plants have been retained and managed;
- Long-term monitoring of key populations that in any one year have at least 20 individuals; and
- Map known populations and identify sites with over 20 plants.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

There are no existing recovery plans for *Sarcochilus hartmannii*. DECCW (2005b) has listed six priority actions for this species:

- Develop targeted education and awareness program highlighting threats to native orchids from illegal collecting, including advice to only purchase plants from licensed nurseries;
- Reserve fire management Strategy to include operational guidelines to protect this species from fire;
- Develop Environmental Impact Assessment guidelines;
- Re-route walking tracks away from known populations of *Sarcochilus hartmanii*;
- Assess weed threats, particularly Mist Flower and Crofton Weed; and
- Survey to confirm populations at known locations and survey nearby potential habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Cryptostylis hunteriana* and *Sarcochilus hartmanii.* As such, a referral to

the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005a) Leafless Tongue-orchid – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10187

DECCW (2005b) Hartman's Sarcochilus – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10745

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

Department of the Environment, Water, Heritage and the Arts (2009). EPBC Act Policy Statement 1.1 Significant Impact Guidelines. Matters of National Environmental Significance. Commonwealth of Australia

1.1.12 Pygmy Cypress Pine (*Callitris oblonga*) and Red Lilly Pilly (*Syzygium hodgkinsoniae*)

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Callitris oblonga* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Syzygium hodgkinsoniae* (Vulnerable, EPBC Act; Vulnerable, TSC Act) are likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present.

The Project may result in the clearing of potential habitat in the form of vegetation. Given the distribution of the above listed species, the Project has the potential to result in a long-term decrease in the size of a population of *Callitris oblonga* and *Syzygium hodgkinsoniae.*

b) reduce the area of occupancy of an important population

Callitris oblonga is located in NSW (two subspecies) and Tasmania (one subspecies). In NSW, the subspecies *parva* occurs in northern NSW on the eastern edge of the New England Tablelands. Subspecies *corangensis* occurs in the Corang River Catchment. *Callitris oblonga* is also considered likely to occur within the Project area. Give the scattered nature of this species, the works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Callitris oblonga.*

Syzygium hodgkinsoniae has a restricted range from the Richmond River in north-east NSW to Gympie in Queensland. This species is sparsely distributed, but can be found locally common in some parts of its range. *Syzygium hodgkinsoniae* is also considered likely to occur within the Project area. Give the scattered nature of this species, the works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Syzygium hodgkinsoniae.*

c) fragment an existing important population into two or more populations

The above species are considered likely to occur within the Project area. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. However, as the exact locations of the above species in the Project area are unknown, it is difficult to determine whether the Project would result in the fragmentation of existing populations into two or more populations.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Callitris oblonga is a fast growing species with seeds that germinate readily. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

Little is known about the breading cycle of *Syzygium hodgkinsoniae*. The flowers of this species are off white, fluffy and honey scented. The fruit are 4cm in diameter, round and bright red. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

In NSW, *Callitris oblonga* occurs along sandy watercourses, shrubland, open woodland and dry sites such as exposed ridges. The main threats to the survival of this species include clearing and fragmentation of habitat for agriculture, frequent fire, grazing, weed infestation, disturbance by roadworks and roadside maintenance, erosion, damage by trail bikes and local extinction due to small, scattered populations. This species is also naturally killed by flood-waters. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Syzygium hodgkinsoniae is mainly found in riverine and subtropical rainforest on rich alluvial or basaltic soils. The key threats to the survival of this species include clearing and fragmentation of habitat for development, agriculture, road-works and powerlines, weed infestation, grazing, general degradation of rainforest habitat, roadside slashing and mowing and illegal collection for horticulture. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Callitris oblonga may be threatened by invasive species such as Blackberry (*Rubus fruiticosus*) and potential from *Pimus radiata* and Broom (*Cytisus sp*.) Weed infestation has been identified as a threat to *Syzygium hodgkinsoniae,* however specific species have not been mentioned. It is possible that invasive species already exist within the Project area. Invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of areas. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for *Callitris oblonga* and *Syzygium hodgkinsoniae*.

Given the possibility of existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to the above species becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for the above species. However DECCW (2005) has defined several recovery actions for each species.

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of *Callitris oblonga*, *Syzygium hodgkinsoniae*.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Callitris oblonga* and *Syzygium hodgkinsoniae.* As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Approved Conservation Advice for *Callitris oblonga* (Pygmy Cypress Pine). Viewed online 25/11/2010. http://www.environment.gov.au/biodiversity/threatened/species/pubs/66687-conservation-advice.pdf

Department of Climate Change and Water (2005) Threatened species - *Callitris oblonga*. Viewed online 25/11/2010 http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10132

Department of Climate Change and Water (2005) Threatened species - *Syzygium hodgkinsoniae.* Viewed online 25/11/2010 http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10792

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Report.

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.13 Granite Boronia (*Boronia granitica*), Beadle's Grevillea (*Grevillea beadleana*), Torrington Beard-heath (*Leucopogon confertus*) and Nightcap Plectranthus (*Plectranthus nitidus*)

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

a) lead to a long-term decrease in the size of an important population of a species

Boronia granitica (Endangered, EPBC Act; Vulnerable, TSC Act) occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland (DECCW, 2005a). The Atlas of NSW Wildlife (DECCW, 2010) shows a *Boronia granitica* population within the Torrington State Recreation Area to the south and south-east of the western extent of the Alignment West. As no

individuals were identified in and around the study area, and the known locations are remote from the Alignment West, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Grevillea beadleana (Endangered, EPBC Act; Endangered, TSC Act) is known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Shannon Creek south-west of Grafton (DECCW, 2005b). The Atlas of NSW Wildlife (DECCW, 2010) shows the locations nearest to the proposed Alignment West are located to the south-west of Tenterfield and in the Torrington State Recreation Area and environs. All populations are located a significant distance from the proposed Alignment West. As such, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Leucopogon confertus (Endangered, EPBC Act; Endangered, TSC Act) has not been located recently and may be extinct. The only collection record is from near Torrington, in the Northern Tablelands (DSEWPC, 2010).

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since *Boronia granitica* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

Grevillea beadleana populations are located a significant distance from the Alignment West. Since *Grevillea beadleana* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Boronia granitica* being fragmented.

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Grevillea beadleana* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Boronia granitica*, *Grevillea beadleana, Leucopogon confertus* or *Plectranthus nitidus.*

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Boronia granitica* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Grevillea beadleana* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Boronia granitica* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

The known habitat of *Grevillea beadleana* is remote from the proposed Alignment West. The proposal is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Boronia granitica*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). Invasive species are not listed as a threat within the species' National Recovery Plan (NSWNPWS, 2002).

Given the remoteness of known populations of *Grevillea beadleana* it is unlikely that the proposed works will result in the establishment of any additional invasive species. In addition, the *Approved NSW and National Recovery Plan for Grevillea beadleana* (DEC, 2004) does not identify invasive species as a significant threat to the survival of this species.

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Boronia granitica* habitat through construction activities. The National Recovery Plan for *Boronia granitica* does not identify disease as a threat to the species' survival (NSWNPWS, 2002).

Given the remoteness of known populations of *Grevillea beadleana* from the proposed easement, it is highly unlikely that diseases would be introduced into its habitat through construction activities. The National Recovery Plan for *Boronia granitica* does not identify disease as a threat to the species' survival (DEC, 2004).

i) interfere substantially with the recovery of the species.

A National Recovery Plan has been prepared for *Boronia granitica* (NSWNPWS, 2002). The Recovery Plan identifies six broad actions (detailed further in the Plan) to assist in the recovery of this species. These are:

- Implement research and monitoring programs;
- Manage current reserved areas;
- Manage the Torrington State Recreation Area population;
- Manage the Howell and Parlour Mountain populations;
- Publicity; and
- Horticulture.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

A NSW and National Recovery Plan has been prepared for *Grevillea beadleana*. Six recovery objectives have been developed with the overall aim of reducing the risk of extinction of the species:

- Increase knowledge of extant populations through further surveys of known populations and identification of new populations;
- Improve ecological understanding of *Grevillea beadleana*;
- Protect populations on private and leasehold land with the co-operation of the landowner or lessee;
- Promote persistence of *Grevillea beadleana* within current range by reducing or removing threats;
- Increase community awareness of the species and its management; and
- Co-ordinate implementation of the Recovery Plan

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Boronia granitica*, *Grevillea beadleana.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DEC (2004) Approved NSW and National Recovery Plan for *Grevillea beadleana*. New South Wales Department of Environment and Conservation. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/g-beadleana/index.html

DECCW (2005a) Granite Boronia – Profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10098

DECCW (2005b) Beadle's Grevillea – Profile http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10360

DECCW (2010) NPWS – Atlas of NSW Wildlife. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

Department of the Environment, Water, Heritage and the Arts (2009). EPBC Act Policy Statement 1.1 Significant Impact Guidelines. Matters of National Environmental Significance. Commonwealth of Australia.

NSWNPWS (2002) National Recovery Plan for *Boronia granitica* (Granite Boronia). NSW National Parks and Wildlife Service. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/b-granitica/index.html

1.1.14 Crescent-leaved Homoranthus (*Homoranthus lunatus*), Rusty Desert Phebalium (*Phebalium glandulosum* subsp*. eglandulosum*), *Phebalium whitei* and Torrington Mint-bush (*Prostanthera staurophylla* sensu stricto)

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

a) lead to a long-term decrease in the size of an important population of a species

Homoranthus lunatus (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs near Tenterfield and Torrington on the New England Tablelands of NSW, including Bald Rock and Boonoo Boonoo National Parks near Tenterfield. (DECCW, 2005a). The Atlas of NSW Wildlife (DECCW, 2010) shows the *Homoranthus lunatus* populations located within and adjacent to the Basket Swamp, Boonoo Boonoo and Bald Rock National Parks. All mapped populations are located at a significant distance to the north of the Alignment West. As no individuals were identified in and around the study area, and the known locations are remote from the Alignment West, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Phebalium glandulosum subsp*. eglandulosum* (Vulnerable, EPBC Act; Endangered, TSC Act) is found in NSW in the Torrington district and in the Severn River Nature Reserve north-west of Glen Innes, on the New England Tablelands (DECCW, 2005b). The Atlas of NSW Wildlife (DECCW, 2010) shows the locations of mapped populations are a significant distance to the south of the proposed Alignment West. As all populations are located at a distance from the proposed alignment, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Phebalium whitei (Vulnerable, EPBC Act; Not listed, TSC Act) is known from south-east Queensland in the Stanthorpe area from Lyra to Wyberba. It is conserved in Girraween National Park. Collections have been made along Bald Rock Creek, at Wyberba, Lyra and The Junction, Girraween NP. Two populations occur in Girraween NP (DSEWPC, 2008a). The noted populations of this species are located remotely from the Alignment West. It is therefore unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Prostanthera staurophylla sensu stricto (Vulnerable, EPBC Act; Endangered, TSC Act) is known from a single location near Mt Mackenzie, south-west of Tenterfield (DSEWPC, 2008b). As the Alignment West is positioned to the north of Tenterfield, the proposal will not impact on this population. It is therefore unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction

b) reduce the area of occupancy of an important population

The known locations of *Homoranthus lunatus* have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since *Homoranthus lunatus* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

Phebalium glandulosum subsp*. eglandulosum* populations are located a significant distance from the Alignment West. Since *Phebalium glandulosum* subsp*. eglandulosum* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

Known populations of *Phebalium whitei* are located at a distance from the Alignment West. The proposal is unlikely therefore to impact on an important population of the species.

As the known population of *Prostanthera staurophylla* sensu stricto is located remotely from the Alignment West, the proposal is unlikely to impact on an important population of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Homoranthus lunatus* being fragmented.

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Phebalium glandulosum* subsp*. eglandulosum* being fragmented.

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Phebalium whitei* being fragmented.

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Prostanthera staurophylla* sensu stricto being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Homoranthus lunatus*, *Phebalium glandulosum* subsp*. eglandulosum, Phebalium whitei* or *Prostanthera staurophylla* sensu stricto*.*

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Homoranthus lunatus* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Phebalium glandulosum* subsp*. eglandulosum* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Phebalium whitei* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Prostanthera staurophylla* sensu stricto will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Homoranthus lunatus* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

The known habitat of *Phebalium glandulosum* subsp*. eglandulosum* is remote from the proposed Alignment West. The proposal is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species.

The known habitat of *Phebalium whitei* is remote from the proposed Alignment West. The proposal is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species.

The known habitat of *Prostanthera staurophylla* sensu stricto is remote from the proposed Alignment West. The proposal is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Homoranthus lunatus*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010).

Given the remoteness of known populations of *Phebalium glandulosum* subsp*. eglandulosum* it is unlikely that the proposed works will result in the establishment of any additional invasive species. Weeds are not known to be a major threat to this species.

As populations of *Phebalium whitei* are located away from the proposed Alignment West. It is highly unlikely that the proposal will result in the introduction of a harmful invasive species to the habitat of this species*.*

Given the distance of the known populations from the proposal, it is unlikely that works will contribute to the introduction of invasive weeds to this species habitat.

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Homoranthus lunatus* habitat through construction activities.

Given the remoteness of known populations of *Phebalium glandulosum* subsp*. eglandulosum* from the proposed easement, it is highly unlikely that diseases would be introduced into its habitat through construction activities.

Given the remoteness of known populations of *Phebalium whitei* from the proposed easement, it is highly unlikely that diseases would be introduced into its habitat through construction activities.

Given the remoteness of known populations of *Prostanthera staurophylla* sensu stricto from the proposed easement, it is highly unlikely that diseases would be introduced into its habitat through construction activities.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Homoranthus lunatus*. DECCW (2005a) has proposed a single priority action for this species; Control feral animals within the species range.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

There are no existing recovery plans for *Phebalium glandulosum* subsp*. eglandulosum*. DECCW (2005b) has proposed a single priority action for this species; Control and monitor feral and domestic ungulate disturbance in known and potential habitat.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

There are no existing recovery plans for *Phebalium whitei.* DSEWPC (2008a) proposes the following recovery and threat abatement actions that are relevant to the Project:

- Monitor known populations to identify key threats;
- Ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate or vegetation disturbance in areas where P. whitei occurs do not adversely impact on known populations;
- Minimise adverse impacts from land use at known sites

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

There are no existing recovery plans for *Prostanthera staurophylla* sensu stricto. However DSEWPC (2008b) has proposed the following priority action for this species relevant to the Project:

- Ensure maintenance activities (or other infrastructure or development activities involving substrate or vegetation disturbance) in areas where *Prostanthera staurophylla* occurs do not adversely impact on known populations.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Homoranthus lunatus*, *Phebalium glandulosum* subsp*. eglandulosum, Phebalium whitei* and *Prostanthera staurophylla* sensu stricto*.* As such, a referral to the Minister is not required*.* A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005a) Crescent-leaved Homoranthus – Profile
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1.1.15 Rusty Rose Walnut (*Endiandra hayesii*), Rough-shelled Bush Nut (*Macadamia tetraphylla*) and Onion Cedar (*Owenia cepiodora*)

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Endiandra hayesii* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Macadamia tetraphylla* (Vulnerable, EPBC Act; Vulnerable, TSC Act) and *Owenia cepiodora* (Vulnerable, EPBC Act; Vulnerable, TSC Act) are likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. The Project therefore has the potential to result in a long-term decrease in the size of a population of each of the above species.

b) reduce the area of occupancy of an important population

Endiandra hayesii has a restricted distribution from Burleigh Heads in Queensland to the Richmond River in north-east NSW, where it locally abundant in some locations. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Endiandra hayesii.*

Macadamia tetraphylla is largely confined to the Richmond and Tweed Rivers in north-east NSW, with a limited range extending across the border into Queensland. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Macadamia tetraphylla*.

Owenia cepiodora is distributed north from the Richmond River in north-east NSW, extending just across the Queensland border. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Owenia cepiodora.*

c) fragment an existing important population into two or more populations

Endiandra hayesii, Macadamia tetraphylla and *Owenia cepiodora* are all likely to occur within the Project area. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Endiandra hayesii, Macadamia tetraphylla* and *Owenia cepiodora* habitat.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Endiandra hayesii has been observed to flower in January, March, May, October and November. Flowers are small and white to pale green, and are held in small clusters. The fleshy fruits are egg-shaped, 2.5-3cm long, and purplish-black when ripe. Fruits have been recorded in March, May, October and November and are likely to be distributed by birds. Cleared fresh seed of this species has been observed to germinate readily within eight weeks. It is likely that this species is insect pollinated.

Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region, the Project has the potential to disrupt the breeding system of a population of *Endiandra hayesii*.

Macadamia tetraphylla has a creamy pink to purple flowers that hang in long strings among the leaves. The fruit is woody brown and globular. Edible seeds are enclosed in a brown shell inside a round green husk. *Macadamia tetraphylla* is estimated to have a lifespan of over 100 years, with a juvenile period greater than six years (DSEWPC, 2010a).

Flowering occurs from August to October and is recorded fruiting between January and April. The species reproduces from seed and seed dispersal is via streams. Clean nuts germinate within a period of two weeks and the seed remains viable for a period of a few weeks to six months. Vegetative resprouting and new seedlings have been recorded following habitat damage (DSEWPC, 2010). Given the existing 132kV easement and associated access tracks, as well as the dominance of agricultural and forestry related activities in the region, the Project has the potential to disrupt the breeding system of a population of *Macadamia tetraphylla*.

Little is known about the breeding cycle of *Owenia cepiodora*. The flowers of the *Owenia cepiodora* are white and in clusters at the ends of branchlets. The species produces red fruit that are 15-20mm wide, with white pulpy flesh surrounding a stone with one or two seeds. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Endiandra hayesii occurs in subtropical and warm temperate rainforests and Brush Box forests. The altitude varies from near sea-level to 800m. The main threats to this species include loss of habitat through clearing and development, the presence of low numbers and weed infestation. In addition, reduced and fragmented populations are likely to suffer loss of genetic variation due to loss of individuals with unique genetic variants, inbreeding and genetic drift. It is also unknown the extent to which fruit collections from wild populations takes place. Further surveys may be required to determine the extent of the threats listed above.

Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Macadamia tetraphylla is usually found in the subtropical rainforest near the coast, complex notophyll vineforest, at the margins of these forests and in mixed scelrophyll forest (DSEWPC, 2010a). The main threats to this species include clearing and fragmentation due to development, agriculture and roadworks, the presence of low numbers, grazing and trampling, fire, weed invasion and loss of local genetic strains. Given this knowledge of the species current habitat and main threats, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Owenia cepiodora occurs in subtropical and dry rainforest on or near soils derived from basalt. The main threats to the survival of this species include habitat loss and fragmentation, grazing, fire, weed invasion, climate change, active acid sulphate soils and the removal of dead wood. Given this knowledge of the species current habitat and main threats, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Endiandra hayesii may be threatened by invasive species such as Lantana (*Lantana camara*) and Camphor Laurel (*Cinnamomum camphora*). These species may compete with *Endiandra hayesii* and can smother seedlings as they emerge. It is also recognised that due to its high flammability, *Lantana camara* may increase the fire risks to *Endiandra hayesii* (DSEWPC, 2010b).

Macadamia tetraphylla may be threatened by invasive species such as the Mickey Mouse Plant (*Ochna serrulata*), Privet (*Ligustrum* spp.), Mistflower (*Ageratina riparia*), Groundsel (*Baccharis halimifolia*), Camphor Laurel (*Cinnamomum camphor*), Lantana (*Lantana camara*), Passionfruit (*Passiflora edulis*), *Pinus* spp., Blue Billygoat-weed (*Ageratum houstonianum*), Crofton-weed (*Eupatorium adenophorum*), Mist-flower (*Eupatorium riparium*), Silver-leaved Desmodium (*Desmodium uncinatum*) and Wild Tobacco Tree (*Solanum mauritianum*) (DSEWPC, 2010a).

Owenia cepiodora may also be threatened by invasive species such as Lantana (*Lantana camara*).

It is possible that each of these invasive species listed above already exist within the Project area. Each of these invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of waterways throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Endiandra hayesii, Macadamia tetraphylla* and *Owenia cepiodora* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

A recovery plan currently exists for the *Endiandra hayesii.* The overall objective of this recovery plan is to prevent the decline of populations of *Endiandra hayesii* in the wild, to ensure ongoing viability of wild populations, and to maintain the evolutionary potential of the taxa (Department of Environment and Conservation (NSW), 2004).

There are no existing recovery plans for the *Macadamia tetraphylla* and *Owenia cepiodora.* However DECCW (2005) has defined several recovery actions for each species.

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of the above species.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Endiandra hayesii, Macadamia tetraphylla* and *Owenia cepiodora*. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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1.1.16 Sweet Myrtle (*Gossia fragrantissima*), Ripple-leaf Muttonwood (*Myrsine richmondensis*) and Purple-leaf Muttonwood (*Rapanea sp. Richmond River*)

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Gossia fragrantissima* (Endangered, EPBC Act; Endangered, TSC Act), *Myrsine richmondensis* (Endangered, EPBC Act; Endangered, TSC Act) and *Rapanea sp. Richmond River* (Endangered, EPBC Act) are likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. Given the species known populations and distribution, the Project has the potential to result in a long-term

decrease in the size of a population of *Gossia fragrantissima, Myrsine richmondensis* and *Rapanea sp. Richmond River*.

b) reduce the area of occupancy of the species

Gossia fragrantissima is distributed throughout south-east Queensland and north-east NSW south to the Richmond River. This species is mainly found on basalt derived soils. The species has been identified as likely to occur within the Project area. As the Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Gossia fragrantissima*.

Myrsine richmondensis occurs in only a few populations at Coraki, Boatharbour near Lismore and the Cherry Tree area west of Casino. The population west of Casino is the largest known population with in excess of 370 plants. This species is also considered likely to occur within the Project area. As the Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Myrsine richmondensis*.

Rapanea sp. Richmond River was thought to be extinct until it was rediscovered in 1991. This species has been recorded from near Coraki on the Richmond River in northern NSW northwards towards Mt. Warning. *Rapanea sp. Richmond River* is currently known to exist in the Boatharbour Nature Reserve and on one private property site near Tatham. Less than 50 individuals are known to exist. The EPBC Act Protected Matter Report has identified this species as being likely to also occur within the Project area. As the Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Rapanea sp. Richmond River*.

Mitigation measures are recommended to minimise the potential impact on these species.

c) fragment an existing population into two or more populations

The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Gossia fragrantissima, Myrsine richmondensis* and *Rapanea sp. Richmond River*.

Mitigation measures are recommended to minimise the potential impact on these species.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

Little is known about the breeding cycle of *Gossia fragrantissima.* The flowers of *Gossia fragrantissima* are small, white and fragrant and are followed by small, round, yellow to orange berries. The Project has the potential to have an impact on the breeding system of the *Gossia fragrantissima* population likely to exist within the Project area.

The flowers of *Myrsine richmondensis* are small, with prominent raised glands. Flowering has been recorded as occurring between October and December. Fruit has been recorded in November and early January. Field observations indicate that this species relies on both seed production and suckering for reproduction. It is unknown how this species is pollinated,

however it is considered likely that this species is insect-pollinated. Seed dispersal is unknown (DECCW, 2004). There is little other known information about the breeding cycle of this species. The Project has the potential to have an impact on the breeding system of the *Myrsine richmondensis* population likely to exist within the Project area.

Little is known about the breeding cycle of *Rapanea sp. Richmond River.* It is however, known to be capable of setting fruit, producing seed and germinating. The Project has the potential to have an impact on the breeding system of the *Rapanea sp. Richmond River* population likely to exist within the Project area.

Mitigation measures are recommended to minimise the potential impact on these species.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Gossia fragrantissima occurs mainly in dry subtropical and riverine rainforest. It is also known that this species can grow as isolated plants from roots left in the ground when rainforest is cleared. The main threats to the survival of this species include habitat degradation through weed invasion and disturbance, loss of habitat associated with clearing and fragmentation and grazing. Local extinction is also a risk due to populations being so small. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Myrsine richmondensis grows in subtropical and dry rainforest and swamp forest on creek flats and slopes. The main threats to the survival of this species include the widening and maintenance of roads, loss of habitat associated with clearing and fragmentation, fire along the edges of rainforest patches, weed infestation and grazing. Local extinction is also a risk due to populations being so small. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Rapanea sp. Richmond River grows in swamp sclerophyll forest/rainforest ecotone on the Richmond River floodplain. The main threats to the survival of *Rapanea sp. Richmond River* are grazing and trampling, weed infestation, loss of habitat associated with clearing and fragmentation an extremely low number of populations/individuals. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Mitigation measures are recommended to minimise the potential impact on these species.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Little information exists as to the impact invasive species can have on existing populations of *Gossia fragrantissima* and *Rapanea sp. Richmond River* in the Project area, however it is noted that weed infestation is one of the main threats to both species.

All known populations of *Myrsine richmondensis* are threatened by weed infestation (particularly Lantana, exotic vines and Honey Locust) and competition (DECCW, 2005a). A list of the prominent weed species to threaten and compete with *Myrsine richmondensis* is provided inthe Approved NSW and National Recovery Plan (DECCW, 2004).

It is possible that invasive species already exist within the Project area and could potentially displace populations *Gossia fragrantissima, Myrsine richmondensis* and *Rapanea sp. Richmond River*. Invasive species may also be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and

organic matter during works undertaken. Mitigation measures are recommended in **Section 7** to minimise the risk of invasive species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Gossia fragrantissima, Myrsine richmondensis* and *Rapanea sp. Richmond River* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

It is considered unlikely that the Project would introduce any diseases that may cause the above species to decline. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the diseases into all areas associated with the Project.

i) interfere with the recovery of the species.

A recovery plan has been developed for *Myrsine richmondensis*. This plan describes a number of key recovery actions for this species. Some of the actions relevant to the Project area include installing roadside markers where the species is likely to be affected by maintenance of road verges, site assessment of population/s that exist within the Project area, continuation of weed control and bush regeneration programs and exclusion of fire from know habitat.

A recovery plan for *Gossia fragrantissima* has not yet been developed. However, DECCW (2005b) has defined several relevant recovery actions for each species as listed below:

Gossia fragrantissima

- Undertake weed control in habitat areas.
- Investigate opportunities for reservation of unsecured populations.
- Undertake habitat rehabilitation and restoration in habitat areas, particularly where *Gossia fragrantissima* occurs as isolated paddock trees.
- Monitor populations on a regular (3-5 yrs) basis. Establish permanently marked plots for monitoring.
- Conduct targeted surveys in habitat areas.

A recovery plan for *Rapanea sp. Richmond River* is currently being prepared for this species by the NSW National Parks and Wildlife Service.

Mitigation measures in the Project area are recommended to ensure that no interference with the recover of these species occurs.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Gossia fragrantissima, Myrsine richmondensis* and *Rapanea sp. Richmond River*. As such, a referral to the Minister is has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

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1.1.17 Thorny Pea (*Desmodium acanthocladum*), Brush Sophora (*Sophora fraseri*) and Creek Triplarina (*Triplarina imbricata*)

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Desmodium acanthocladum* (Vulnerable, EPBC Act; Vulnerable, TSC Act), *Sophora fraseri* (Vulnerable, EPBC Act; Vulnerable, TSC Act) and *Triplarina imbricata* (Endangered, EPBC Act; Endangered, TSC Act) are considered likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. The Project therefore has the potential to result in a long-term decrease in the size of a population of each of the above species.

b) reduce the area of occupancy of an important population

Desmodium acanthocladum only occurs in north east NSW. It is found in the Lismore area, and there are also records from near Grafton, Coraki, Casino and Mount Warning area. This species is consdiered likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Desmodium acanthocladum.*

Sophora fraseri is found north of Casino through to north-east NSW, where it is very rare. It is also located in south-east Queensland where it is widespread but not common. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Sophora fraseri.*

Triplarina imbricata is only found in a small number of locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Triplarina imbricata.*

c) fragment an existing important population into two or more populations

Desmodium acanthocladum, *Sophora fraseri* and *Triplarina imbricata* are all likely to occur within the Project area. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Desmodium acanthocladum*, *Sophora fraseri* and *Triplarina imbricata* habitat.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Little is known about the breeding cycle of *Desmodium acanthocladum*. Flowering occurs in summer followed by a stick seed pod about 5 cm long. As the ecology of this species is largely unknown, it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

The pale yellow flowers of the *Sophora fraseri* have the shape of a typical pea flower, and are arranged in groups at the ends of branches. The seed pods are 3-10cm long and contain two to six seeds. Little is known about the breeding cycle of this species. Without further information it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

Triplarina imbricata is a newly recognised species previously thought to be the same as *Baeckea camphorate*. This species produces little white flowers borne in pairs. Little is known about the breeding cycle of this species. Without further information it is difficult to determine whether the Project will disrupt the breeding cycle of this population.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Desmodium acanthocladum occurs mainly in dry rainforest, in the fringes of riverine subtropical rainforest and on basalt-derived soils at low elevations. The main threats to the survival of this species include damage to plants and habitat by roadworks, clearing and fragmentation for agriculture or development, browsing and trampling by stock and weed infestation. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Sophora fraseri usually occurs in moist situations, often near rainforest. The main threats to this species include loss of habitat through clearing and development, weed infestation, inappropriate fire regimes, and timber harvesting activities. This species is at risk of local extinction because populations are small. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Triplarina imbricata occurs mainly along watercourses in low open forest with *Tristaniopsis laurina*. The main threats to the survival of this species include habitat loss and fragmentation, fire, weed infestation and damage to plants by visitors in riverside recreational areas. This species is at risk of local extinction because populations are small. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Desmodium acanthocladum may be threatened by invasive species such as Asparagus and Lantana. *Sophora fraseri* may also be threatened by a variety of invasive species, especially Lantana. *Triplarina imbricata* may be threatened in the Project area by invasive species including Small-leaved Privet and Lantana. It is possible that each of these invasive species already exist within the Project area.

Each of these invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of areas. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for *Desmodium acanthocladum, Sophora fraseri* and *Triplarina imbricata*.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Desmodium acanthocladum, Sophora fraseri* and *Triplarina imbricata* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Desmodium acanthocladum, Sophora fraseri* or *Triplarina imbricata*. However DECCW (2005) has defined several recovery actions for each species as listed below, relevant to the Project:

Desmodium acanthocladum

- Support local Landcare groups and bush regeneration teams.
- Provide stock watering points away from streams.
- Exclude stock by fencing off habitat areas.
- Protect known populations during roadworks.
- Control weeds.
- Protect known and potential habitat from clearing or development.
- Rehabilitate and expand streamside habitat.
- Notify DEC of any new records of Thorny Pea.

Sophora fraseri

- Support local Landcare groups and bush regeneration teams.
- Protect areas of habitat from frequent fire.
- Protect areas of habitat during timber harvesting activities.

- Control weeds in and near habitat.
- Protect known and potential habitat from clearing and development.
- Report new records of *Sophora fraseri* to DECCW.

Triplarina imbricata

- Take care to avoid damaging native vegetation at riverside recreation spots.
- Protect creekside habitat from fire.
- Protect creek-bank vegetation from disturbance.
- Assist with the control of introduced weeds in creekside habitats.
- Expand and connect remnants of creekside vegetation.
- Notify DEC of additional occurrences of *Triplarina imbricata*

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of the above species.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Desmodium acanthocladium, Sophora fraseri* and *Triplarina imbricata*. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species - *Desmodium acanthocladium*. Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10218

Department of Climate Change and Water (2005) Threatened species - *Sophora fraseri.* Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10764

Department of Climate Change and Water (2005) Threatened species - *Triplarina imbricata.* Viewed online 24/11/2010
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10812

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.18 Slender Marsdenia (*Marsdenia longiloba*) and Northern Clematis (*Clematis fawcettii*)

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

a) lead to a long-term decrease in the size of an important population of a species

Marsdenia longiloba (Vulnerable, EPBC Act; Endangered, TSC Act) occurs in scattered sites on the north coast of NSW from Hastings River northwards to Nebo in Queensland. It is also conserved within the Lamington National Park (NP), Main Range NP, Mt Barney NP, and Toonumbar NP (DEWHA, 2008a). The Atlas of NSW Wildlife (DECCW, 2010) shows a *Marsdenia longiloba population* occurring in scattered locations, remote from the Alignment in both the East and West. Given that these populations are remote from the Alignment, it is

unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

Clematis fawcettii (Vulnerable, EPBC Act; Vulnerable, TSC Act) occurs from the Richmond River in north-east NSW to the Bunya Mountains in south-east Queensland. This species is conserved within the Lamington National Park (NP), Main Range NP, Mt Barney NP, and Toonumbar NP (DEWHA, 2008b). The Atlas of NSW Wildlife (DECCW, 2010) shows scattered *Clematis fawcettii* populations to the north and east of the Alignment East. Given that these populations are remote from the Alignment, it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of *Marsdenia longiloba* have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment avoids all mapped locations. Furthermore, since the populations of *Marsdenia longiloba* were not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

The known locations of *Clematis fawcettii* have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment avoids all mapped locations. Furthermore, since the populations of *Clematis fawcettii* were not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the location and relative remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Marsdenia longiloba* being fragmented.

It is unlikely that the proposal will result in any populations of *Clematis fawcettii* being fragmented, particularly given the remoteness of current records of this species from the Alignment East.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat for *Marsdenia longiloba* is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Marsdenia longiloba*. Furthermore, no critical habitat for *Clematis fawcettii* is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Clematis fawcettii*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Marsdenia longiloba* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

No areas of known habitat for *Clematis fawcettii* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Marsdenia longiloba* are remote from the proposed Alignment, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

As the known locations of *Clematis fawcettii* are remote from the proposed Alignment, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Marsdenia longiloba*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). However, invasive species such as *Lantana camara* (lantana) are listed as a threat within the species' Approved Conservation Advice and will need to be considered during the Project (DEWHA, 2008a).

Due to the remoteness of the proposal from the known locations of *Clematis fawcettii*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). However, invasive species including *Lantana camara* (lantana), *Ageratina riparia* (mist flower) and *A. adenophora* (Crofton weed) are listed as a threat within the species' Approved Conservation Advice and will need to be considered during the Project (DEWHA, 2008b).

h) introduce disease that may cause the species to decline, or

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Marsdenia longiloba* habitat through construction activities. The Approved Conservation Advice for *Marsdenia longiloba* does not identify disease as a threat to the species' survival (DEWHA, 2008a).

Given the remoteness of known specimens from the proposed easement, it is highly unlikely that diseases would be introduced into *Clematis fawcettii* habitat through construction activities. The Approved Conservation Advice for *Clematis fawcettii* does not identify disease as a threat to the species' survival (DEWHA, 2008b).

i) interfere substantially with the recovery of the species.

There is no recovery plan currently in place for *Marsdenia longiloba,* however the DECC has identified a number of strategies to assist in the recovery of this species (DECC, 2005a). Those relevant to the Project are:

- Site protection including fencing and signage.
- Weed control.
- Survey/mapping and habitat assessment.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that *Marsdenia longiloba* occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of these species, as no known individuals will be impacted, nor will any known habitat.

There is no recovery plan currently in place for *Clematis fawcettii,* however the DECC has identified a number of strategies to assist in the recovery of this species (DECC, 2005b). Those relevant to the Project are:

- Protect areas of known habitat
- Weed control.

- Survey/mapping and habitat assessment.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that *Clematis fawcettii* occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of these species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Marsdenia longiloba or Clematis fawcettii.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005a) Slender Marsdenia – Profile. Available from: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10507

DECCW (2005b) Northern Clematis – Profile. Available from: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10169

DECCW (2010) NPWS – Atlas of NSW Wildlife. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

DEWHA (2008a) Threatened Species Scientific Committee. *Commonwealth Conservation Advice on* Marsedenia longiloba Online. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/2794-conservation-advice.pdf.

DEWHA (2008b) Threatened Species Scientific Committee. *Commonwealth Conservation Advice on* Clematis fawcettii *(Stream Clematis).* Online. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/4311-conservation-advice.pdf

1.1.19 Wandering Pepper Cress (*Lepidium peregrinum*)

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Lepidium peregrinum* (Endangered, EPBC Act; Endangered, TSC Act) is likely to occur based on previous records (Atlas of NSW Wildlife, EPBC Act Protected Matter Report) and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. Given the species known populations and distribution, the Project has the potential to result in a long-term decrease in the size of a population of *Lepidium peregrinum*.

b) reduce the area of occupancy of the species

Lepidium peregrinum was thought to be extinct until recently rediscovered in NSW and Queensland. Research confirmed scattered populations in north-eastern NSW (near Tenterfield) and south-eastern Queensland. The largest population of this species has been identified in the Travelling Stock Reserve. This species has also been identified as being likely to occur within the Project area. As the Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Lepidium peregrinum*.

Mitigation measures are recommended to minimise the potential impact on these species.

c) fragment an existing population into two or more populations

The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Lepidium peregrinum.*

Mitigation measures are recommended to minimise the potential impact on these species.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

Lepidium peregrinum flowers from January to April. Studies have indicated that *Lepidium peregrinum* subpopulations have little to no recruitment, while other have juvenile plants in the absence of mature plants. This species may require specific triggers to break seed dormancy. It is possible the species persists in some location as dormant seed with no vegetative specimens being evident. Mature plant populations experience a boom and bust cycle.

There is little other known information about the breeding cycle of this species. The Project has the potential to have an impact on the breeding system of the *Lepidium peregrinum* population likely to exist within the Project area.

Mitigation measures are recommended to minimise the potential impact on these species.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The largest population of *Lepidium peregrinum* occurs mainly in open riparian forest on the banks of the Tenterfield creek at Clifton. Sandy alluvium is the main soil type at this site. The main threats to the survival of this species include loss of habitat associated with clearing and fragmentation, grazing (considered to be the primary threat), weed infestation, extended drought periods and destruction of plants following mis-identification. Local extinction is also a risk due to populations being generally small. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Mitigation measures are recommended to minimise the potential impact on these species.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Little information exists as to the impact invasive species can have on existing populations of *Lepidium peregrinum* in the Project area, however it is noted that weed infestation is one of the main threats to this species.

It is possible that invasive species already exist within the Project area and could potentially displace populations of *Lepidium peregrinum*. Invasive species may also be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken. Mitigation measures are recommended in **Section 7** to minimise the risk of invasive species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Lepidium peregrinum* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

It is considered unlikely that the Project would introduce any diseases that may cause the above species to decline. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the diseases into all areas associated with the Project.

i) interfere with the recovery of the species.

A recovery plan for *Lepidium peregrinum* has not yet been developed. However, DECCW (2005) has defined several relevant recovery actions such as the:

- Control rabbits and goats at the site
- Maintain the understorey of site through appropriate fire management
- Repair or restore fencing between Travelling Stock Route and adjacent freehold land
- Control weeds in riverine habitat at the site; and
- Monitor the site every six months.

Mitigation measures in the Project area are recommended to ensure that no interference with the recover of these species occurs.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Lepidium peregrinum*. As such, a referral to the Minister is has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species – *Lepidium peregrinum* Viewed online 26/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10464

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Report.

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 26/11/2010.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.20 White-flowered Wax Plant (*Cynanchum elegans*) and Cryptic Forest Twiner (*Tylophora woolsii)*

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

a) lead to a long-term decrease in the size of a population

Within the Project area, *Cynanchum elegans* (Endangered, EPBC Act; Endangered, TSC Act) is likely to occur based on previous records and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. Given the species known populations and distribution across NSW, the Project has the potential to result in a long-term decrease in the size of a population of *Cynanchum elegans*.

Tylophora woolsii (Endangered, EPBC Act; Endangered, TSC Act) is also likely to occur in the Project area based on previous records and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. The works associated with the Project has the potential to result in a long-term decrease in the size of a population of *Tylophora woolsii.*

b) reduce the area of occupancy of the species

Cynanchum elegans is restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. The species have been listed as likely to occur within the Project area (NSW National Parks and Wildlife Service, 2010). Given the species known populations and distribution across NSW, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Cynanchum elegans*.

Tylophora woolsii is found in small populations from the NSW north coast and New England Tablelands to southern Queensland. This species is known to exist on the Tablelands from the Bald Rock and Boonoo Boonoo areas north of Tenterfield. It has also been listed as likely to occur within the Project area (EPBC Act Protected Matters Report, 2010). Given the species very rare populations in NSW, it is considered likely that works associated with the Project would result in a long-term decrease in the size of a population of *Tylophora woolsii*.

c) fragment an existing population into two or more populations

The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Cynanchum elegans* and *Tylophora woolsii* habitat.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species within NSW.

e) disrupt the breeding cycle of a population

Little is known about the breeding cycle of *Cynanchum elegans.* Flowering occurs primarily between August and May, with the peak in November. Seed production is variable and unreliable and is wind-dispersed. Studies have shown that they are released in a non dormant state and hence are unlikely to persist in the soil seedbank (adapted from NSW Parks and Wildlife Service, 2002). The Project has the potential to have an impact on the breeding system of the *Cynanchum elegans* population likely to exist within the Project area.

Tylophora woolsii grows in moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins. Flowering occurs in summary and autumn, generally between January and March. Fruit is likely to be fully developed between April and July. The seeds are likely to be wind dispersed. There is little other known information about the breeding cycle of this species. The Project has the potential to have an impact on the breeding system of the *Tylophora woolsii* population likely to exist within the Project area.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Cynanchum elegans occurs mainly at the ecotone between dry subtropical rainforest and sclerophyll forest/woodland communities. This species has been recorded in dry subtropical rainforest, littoral rainforest, coastal scrub, open forest and woodland and scrub to open scrub. The main threats to the survival of this species include loss of habitat from clearing, degradation of habitat from weed invasion, grazing and inappropriate fire management, limited suitable habitat and small number of individuals per sub-population. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Tylophora woolsii grows in wet sclerophyll forest and rainforest of the northern and central western slopes of NSW and into southern Queensland. A number of populations also occur along disturbed roadside verges. *Tylophora woolsii* is threatened by forestry activities, clearing for agriculture, grazing and trampling by cattle and road works. Road works in particular has destroyed a number of plants. Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Little information exists as to the impact invasive species can have on existing populations of *Cynanchum elegans* and *Tylophora woolsii* in the Project area. However, it is possible that invasive species already exist within the Project area and could potentially displace populations of *Cynanchum elegans* and *Tylophora woolsii.* Invasive species may also be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken. Mitigation measures are recommended in **Section 7** to minimise the risk of invasive species becoming established in potential habitat for either of these species.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Cynanchum elegans* and *Tylophora woolsii* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

It is considered unlikely that the Project would introduce any diseases that may cause *Cynanchum elegans* and *Tylophora woolsii* to decline. Mitigation measures are recommended in **Section 7** to minimise the risk of the introduction of the diseases into all areas associated with the Project.

i) interfere with the recovery of the species.

Recovery plans for *Cynanchum elegans* and *Tylophora woolsii* have not yet been developed; however, the recovery plan *Tylophora woolsii* is currently in preparation.

Cynanchum elegans is predicted to occur within the Project area based on previous research. Given the presence of the existing 132kV easement the Project has the potential to interfere substantially with the recovery of *Cynanchum elegans*.

The recovery plan for *Tylophora woolsii* (in prep) will outline the management objectives for the effective conservation of the species. A priority of this plan will be to survey for additional populations and monitor known populations so that any threats or population declines can be determined. Where necessary, protection measures may include: prevention of further damage from roadworks, exclusion of cattle or exclusion of logging activities. The Project has the potential to interfere substantially with the recovery of *Tylophora woolsii.*

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Cynanchum elegans* and *Tylophora woolsii*. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2005) Threatened species - *Cynanchum elegans*. Viewed online 23/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10196

Department of Climate Change and Water (2005) Threatened species –*Tylophora woolsii*. Viewed online 23/11/2010.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10816

NSW National Parks and Wildlife Service (2010) Atlas of NSW Wildlife Viewed online 23/11/2010.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

NSW National Parks and Wildlife Service (2002) Threatened Species Information - *Cynanchum elegans*. Viewed online 23/11/2010.
http://www.environment.nsw.gov.au/resources/nature/tsprofileCynanchumElegans.pdf

NSW National Parks and Wildlife Service (2002) Threatened Species Information –*Tylophora woolsii*. Viewed online 23/11/2010.
http://www.environment.nsw.gov.au/resources/nature/tsprofileTyolphoraWoollsii.pdf

NSW National Parks and Wildlife Service (2002) Environmental Impact Assessment Guidelines – *Cynanchums elegans*. Viewed online 23/11/2010.
http://www.environment.nsw.gov.au/resources/nature/CeleganseEia1202.pdf

1.1.21 Rod's Star Hair (*Astrotricha roddii*)

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

a) lead to a long-term decrease in the size of an important population of a species

Astrotricha roddii (Endangered, EPBC Act; Endangered, TSC Act) occurs in NSW in the Ashford area north of Inverell, including Kwiambal and Kings Plains National Parks, Severn River Nature Reserve and Severn River State Forest. (DECCW, 2005a). The Atlas of NSW Wildlife (DECCW, 2010) shows the closest mapped *Astrotricha roddii* populations approximately 7km to the south-east of the proposed Dumaresq substation. These records are remote enough from the Alignment West that the likelihood of presence and impact is

relatively low. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment West avoids all mapped locations. Since *Astrotricha roddii* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment West, it is unlikely that the proposal will result in any populations of *Astrotricha roddii* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Astrotricha roddii*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Astrotricha roddii* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Astrotricha roddii* are remote from the proposed Alignment West, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Astrotricha roddii*, the Project is unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

h) introduce disease that may cause the species to decline, or

There are no diseases known that are likely to cause *Astrotricha roddii* to decline.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Digitaria porrecta*. However DECCW (2005) has proposed the following priority action for this species relevant to the Project:

- Develop standard survey and environmental assessment guidelines for *Astrotricha roddii* and distribute them to all relevant consent authorities.

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government

bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Astrotricha roddii.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) *Astrotricha roddii* – Profile
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10222

DECCW (2005) *Astrotricha roddii* - Priority Actions.
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Shrubs&kingdom=Plant

DECCW (2010) NPWS – Atlas of NSW Wildlife.
http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

1.1.22 Bordered Guinea Flower (*Hibbertia marginata*)

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

a) lead to a long-term decrease in the size of an important population of a species

Hibbertia marginata (Vulnerable, EPBC Act; Vulnerable, TSC Act) is confined to the Richmond Range of NSW. (DSEWPC, 2008). The Atlas of NSW Wildlife (DECCW, 2010) shows the closest mapped *Hibbertia marginata* populations approximately 24km to the south of the Alignment East in Mount Belmore State Forest on the Richmond Range. These records are remote enough from the Alignment West that the likelihood of presence and impact is relatively low. As no individuals were identified in areas targeted in and around the study area it is unlikely that the proposed development will have an adverse effect on the species such that the local populations will be placed at risk of extinction.

b) reduce the area of occupancy of an important population

The known locations of this species have been mapped on the Atlas of NSW Wildlife (DECCW, 2010). The proposal's Alignment East avoids all mapped locations. Since *Hibbertia marginata* was not located along the alignment during REF survey efforts, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as there should not be any clearing of the species.

c) fragment an existing important population into two or more populations

Given the remoteness of current records from the Alignment East, it is unlikely that the proposal will result in any populations of *Hibbertia marginata* being fragmented.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for *Hibbertia marginata*.

e) disrupt the breeding cycle of an important population

No areas of known habitat for *Hibbertia marginata* will be cleared and therefore there should be no disruption to the breeding cycle of the species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As the known locations of *Hibbertia marginata* are remote from the proposed Alignment East, it is considered very unlikely that potential habitat for this species will be removed or modified as a result of the proposed action (DECCW, 2010).

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Due to the remoteness of the proposal from the known locations of *Hibbertia marginata*, the proposed works are unlikely to result in the establishment of any additional invasive species that may result in increased competition to this species (DECCW, 2010). The proposed works are unlikely to result in an alteration to the existing environment such that any invasive species become established in the species' habitat.

h) introduce disease that may cause the species to decline, or

The Approved Conservation Advice for *Hibbertia marginata* (DSEWPC, 2008) notes that the pathogen *Phytophthora cinnamomi* can pose a threat to this species and its habitat. Given the remoteness of known specimens from the proposed easement, it is highly unlikely that this pathogen would be introduced into *Hibbertia marginata* habitat through construction activities.

i) interfere substantially with the recovery of the species.

There are no existing recovery plans for *Hibbertia marginata*. However DECCW (2005) has proposed priority actions for this species relevant to the Project:

- Assess implementation and effectiveness of forestry management prescriptions, and, if needed, develop or refine threatened species prescriptions.
- Consider known populations of *Hibbertia marginata* during environmental planning to protect from clearing or development.
- Survey areas of potential habitat in nearby areas for further populations of *Hibbertia marginata.*

Given the assessment and field survey undertaken as part of this report, and current mapping of specimen records, it is considered unlikely that the species occurs within the easement. The proposed works are unlikely to result in any change to the existing fire regime, and will not alter the presence of stock within the study area. If any individuals are found to occur within the easement during the construction phase, works will cease and appropriate government bodies contacted and consulted with on the appropriate manner in which to proceed. As such, the proposed works will not interfere with the recovery of this species, as no known individuals will be impacted, nor will any known habitat.

Conclusion

The significant impact criteria assessment concludes that the proposal is not likely to significantly impact *Hibbertia marginata.* As such, a referral to the Minister is not required. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

DECCW (2005) *Hibbertia marginata* - Priority Actions. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype_details.aspx?type=Shrubs&kingdom=Plant

DECCW (2010) NPWS – Atlas of NSW Wildlife. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp

DSEWPC (2008) Approved Conservation Advice for *Hibbertia marginata.* http://www.environment.gov.au/biodiversity/threatened/species/pubs/21970-conservation-advice.pdf

1.1.23 *Callistemon pungens*

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

a) lead to a long-term decrease in the size of an important population of a species

Within the Project area, *Callistemon pungens* (Vulnerable, EPBC Act) is likely to occur based on previous records (EPBC Act Protected Matter Report) and habitats present. The Project may result in the clearing of potential habitat in the form of vegetation. The Project therefore has the potential to result in a long-term decrease in the size of a population of *Callistemon pungens*.

b) reduce the area of occupancy of an important population

Callistemon pungens occurs in south-east Queensland and the northern tablelands of north-east NSW. In NSW, it is distributed from near Inverell to the eastern escarpment in New England. In southern Queensland it occurs in the Stanthorpe region. This species is also listed as likely to occur within the Project area. The works associated with the Project have the potential to result in a long-term decrease in the size of a population of *Callistemon pungens*.

Mitigation measures are recommended to minimise the potential impact on these species.

c) fragment an existing important population into two or more populations

Callistemon pungens is likely to occur within the Project area. The Project will require the expansion of the existing 132kV easement to accommodate the proposed 330kV easement. The Project has the potential to result in the fragmentation of existing populations into two or more populations of *Callistemon pungens* habitat.

Mitigation measures are recommended to minimise the potential impact on these species.

d) adversely affect habitat critical to the survival of a species

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

e) disrupt the breeding cycle of an important population

Callistemon pungens flowers over spring and summer, mostly in November. There is little known information about the breeding cycle of this species. The Project has the potential to have an impact on the breeding system of the *Callistemon pungens* population likely to exist within the Project area.

Mitigation measures are recommended to minimise the potential impact on these species.

f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Callistemon pungens occurs along rocky watercourses usually with sandy granite (or occasionally basalt) creek beds. It also occurs mainly amongst native species. The main threats to this species include habitat loss, weed infestation and excessive fragmentation. Fire is also a potential threat.

Given this knowledge of the species current habitat, this Project has the potential to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Callistemon pungens may be threatened by invasive species such as Japanese Honeysuckle (*Lonicera japonica*) and Blackberry (*Rubus anglocandicans*). It is possible that each of these invasive species already exist within the Project area. These invasive species may be accidentally spread via movement of plant and machinery within the Project area, or by transport of stockpiled construction material and organic matter during works undertaken in proximity to waterways. As such, the Project has the potential to result in disturbance to a number of waterways throughout the Project area. Mitigation measures are recommended in **Section 7** to minimise the risk of these species becoming established in potential habitat for *Callistemon pungens*.

Given the existing disturbances within the Project area, and provided recommended mitigation measures are adopted, it is considered unlikely that the Project would result in invasive species that are harmful to *Callistemon pungens* becoming established in the species habitat.

h) introduce disease that may cause the species to decline, or

There are no known diseases that are likely to cause these species to decline. There is no mention in the relevant literature of any potential disease-based threats to these species. Rather, illegal clearing of land in known habitat areas and grazing is more likely to pose a more serious threat.

i) interfere substantially with the recovery of the species.

There is no existing recovery plan for *Callistemon pungens.* However, DECCW (2008) has identified a number of regional and local priority actions. The local priority actions relate to habitat loss, disturbance and modification, invasive weeds and fire.

Given the expansion of the existing 132kV easement to accommodate the proposed 330kV easement, the Project has the potential to interfere substantially with the recovery of the above species.

Mitigation measures in the Project area are recommended to ensure that no interference with the recover of this species occurs.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact on *Callistemon pungens*. As such, a referral to the Minister is has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Department of Climate Change and Water (2008) Approved Conservation Advice for *Callistemon pungens* Viewed online 26/11/2010. http://www.environment.gov.au/biodiversity/threatened/species/pubs/55581-conservation-advice.pdf

Department of Environment, Water, Heritage and the Arts (2010) EPBC Act Protected Matters Report.

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Significant Impact Criteria

1.1 Threatened Ecological Communities

1.1.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland)

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:

a) *reduce the extent of an ecological community*

Box Gum Woodland (Critically Endangered Ecological Community, EPBC Act; Endangered Ecological Community, TSC Act) occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria. It occurs in the Brigalow Belt South, Nandewar, New England Tableland, South Eastern Queensland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes, Victorian Midlands and Riverina Bioregions (Threatened Species Scientific Committee, 2006). Given the large natural range of the community, and given the Project does not fall at the extent of its range, it is considered unlikely that the Project will result in a reduction in the extent of the community.

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

The Project will require the clearing of an easement throughout the Project area to encompass the 300kV Alignment. This will result in some fragmentation of the Box Gum Woodland community within the Project area.

c) *adversely affect habitat critical to the survival of an ecological community*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

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*

Box Gum Woodland generally occurs on fertile lower parts of the landscape where resources such as water and nutrients are abundant (Threatened Species Scientific Committee, 2006). The Project will require the upgrade and installation of several water crossings associated with access tracks throughout the Project area. It is considered unlikely that these works would result in any changes to the availability of water to the community. The community is reliant upon other specific abiotic conditions such as abundant nutrients on fertile plains, however assuming mitigation measures are adopted, it is considered unlikely that the Project would modify or destroy any abiotic factors necessary for the community's survival.

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 species composition of Box Gum Woodland varies across the geographic distribution of the community, in response to changes in climate. Irrelevant of the distribution, the ground layer of intact stands is usually characterised by Kangaroo Grass (*Themeda australis*), Snow Grass (*Poa sieberiana*) and/or River Tussock (*Poa labillardieri*). As Box-Gum Grassy

Woodland becomes degraded the dominance of *Themeda australis* and *Poa* species declines and other native grasses become dominant. With further degradation, native grasses are replaced by annual and perennial introduced species (Threatened Species Scientific Committee, 2006).

The Project will require the clearing of vegetation for an easement. This clearing will result in disturbance to Box Gum Woodland and will result in increased edge effect within the Project area. The Project may result in the establishment or spread of exotic grass species which may result in increased competition for native species. Assuming mitigation measures are adopted, it is not considered likely that the Project would result in a substantial change in the species composition of the Box Gum Woodland outside the Project area; however there will be clearing of vegetation that constitutes this community within the Project area.

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 Project would result in the clearing of vegetation that forms part of the Box Gum Woodland community. This clearing would result in increased edge effect within the Project area, which in turn would increase the likelihood of invasive and exotic species becoming established within the Project area. As such, the Project may result in the establishment of invasive species that may be harmful to the community. Mitigation measures are recommended in **Section 7** to reduce this impact.

g) interfere with the recovery of an ecological community.

A draft recovery plan was placed on public exhibition for comment early in 2010; *Draft National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Department of Environment, Climate Change and Water NSW, 2010). This plan has not been formalised. The draft recovery plan outlines several recovery objectives and actions to assist in the recovery of the community, relevant to the Project:

- Achieving no net loss in extent and condition of the ecological community throughout its geographic distribution.
- Increasing protection of sites in good condition.
- Increasing landscape functionality of the ecological community through management and restoration of degraded sites.

Assuming mitigation measures are adopted, the potential impact of the Project will be significantly lessened, however the Project will result in the clearing of areas of this community. Given the lack of formal recovery plans and the community's naturally widespread (although patchy) distribution, it is considered unlikely that the Project would significantly interfere in the recovery of the Box Gum Woodland community.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact the Box Gum Woodland community. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Threatened Species Scientific Committee (2006). Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Viewed online 23/11/2010.
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/box-gum.pdf

Department of Environment, Climate Change and Water NSW (2010). Draft National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney.

1.1.2 Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Natural Grasslands)

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:

a) reduce the extent of an ecological community

Natural Grasslands (Critically Endangered Ecological Community, EPBC Act) are distributed mainly in the Darling Downs of southern Queensland and the Liverpool Plains and Moree Plains of northern NSW. This community occurs within the Brigalow Belt South Bioregion and Border Rivers-Gwydir, Central West, Namoi, Condamine, Burnett Mary and Fitzroy Basin Natural Resource Management Regions (Threatened Species Scientific Committee, 2008). Given the large natural range of the community, and given the Project does not fall at the extent of its range, it is considered unlikely that the Project will result in a reduction in the extent of the community.

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

The Project will require the clearing of an easement throughout the Project area to encompass the 300kV Alignment. This will result in some fragmentation of the Natural Grasslands community within the Project area.

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

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or DII within the project area. To date, no critical habitat has been declared for this species.

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

The Native Grasslands community is a dynamic ecosystem where species composition can change yearly and seasonally in response to rainfall, temperature, fire, grazing pressure and management (Threatened Species Scientific Committee, 2008). Threats to the community are noted to include:

- Conversion of native pastures to improved pastures and cropping and overgrazing by stock.
- Ploughing.
- Grading.
- Weed invasion.
- Salinity.

- Herbicide and fertiliser spraying.
- Over grazing by native herbivores.
- Trampling.
- Inappropriate management regimes of mowing, burning, tree regeneration and planting, rehabilitation and ecosystem recreation.

The community is reliant upon specific abiotic conditions, however assuming mitigation measures are adopted, it is considered unlikely that the Project would modify or destroy any abiotic factors necessary for the community's survival.

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 species composition within the Native Grasslands community is primarily a result of climatic influences as well as soil properties, such as salinity, fertility or waterlogging (Threatened Species Scientific Committee, 2008). It is considered unlikely that the Project would result in alterations to the climate or soil properties such that the species composition is significantly altered.

The Project may result in the establishment or spread of exotic grass species which may result in increased competition for native species. Assuming mitigation measures are adopted, it is not considered likely that the Project would result in a substantial change in the species composition of the Native Grasslands community outside the Project area; however there will be clearing of vegetation that constitutes this community within the Project area.

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 Project would result in the clearing of vegetation that includes the Native Grasslands community. This clearing would result in increased edge effect within the Project area, which in turn would increase the likelihood of invasive and exotic species becoming established within the Project area. As such, the Project may result in the establishment of invasive species that may be harmful to the community. Mitigation measures are recommended in **Section 7** to reduce this impact.

g) interfere with the recovery of an ecological community.

There are no existing recovery plans for the Native Grasslands community. However the Threatened Species Scientific Committee (2008) has outlined several priority actions for this community, relevant to the Project:

- Monitor known occurrences to identify key threats or the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Identify occurrences of high conservation priority.
- Undertake survey work in potential habitat to locate remnants.
- Avoid slashing during peak flowering season from spring to summer.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the ecological community.

- Ensure road widening and maintenance activities (or other infrastructure or development activities as appropriate) in areas where the ecological community occurs do not adversely impact on known sites.
- Manage disruptions to water flows and any changes to hydrology which may result in changes to the water table levels, increased salinity and increased run off or sediment.
- Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.
- Identify and remove weeds in the local area, which could become a threat to the ecological community, using appropriate methods.
- Develop and implement a management plan for the control of weeds such as Lippia (*Phyla canescens*), Coolatai Grass (*Hyparrhenia hirta*), African Love Grass (*Eragrostis curvula*) and Buffel Grass (*Cenchrus ciliaris*) in the region.
- Manage sites to prevent introduction of invasive weeds, which could become a threat to the ecological community, using appropriate methods.
- Implement good hygiene measures for mowing and grading equipment and observe appropriate state protocols for moving stock.
- Avoid burning (or grazing or slashing) during peak flowering season (spring to summer).

Assuming mitigation measures are adopted, the potential impact of the Project will be significantly lessened, however the Project will result in the clearing of areas of this community. Given the lack of formal recovery plans and the community's natural distribution, it is considered unlikely that the Project would interfere in the recovery of the Native Grasslands community.

Conclusion

The significant impact criteria assessment concludes that the proposal has the potential to significantly impact the Natural Grasslands community. As such, a referral to the Minister has been completed, refer to **Appendix A**. A number of measures are recommended in **Section 7** of this report to mitigate the degree of impact to ensure that biodiversity values within the Project area are maintained or improved.

References

Threatened Species Scientific Committee (2008). *Commonwealth Listing Advice on Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland*. Department of the Environment, Water, Heritage and the Arts. Viewed online 23/11/2010.
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/88-listing-advice.pdf

Threatened Species Scientific Committee (2008). *Commonwealth Conservation Advice on Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland*. Department of the Environment, Water, Heritage and the Arts. Viewed online 23/11/2010.
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/88-conservation-advice.pdf

K

Appendix K TransGrid Policy: Use of Herbicide for Vegetation Control

TransGrid

Use of Herbicide for Vegetation Control

Document Summary

This document describes the use of herbicides and methodologies that are approved for use by TransGrid staff and contractors for controlling vegetation growth on transmission line easements, substations and project works.

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1. Purpose

Surface and ground water resources are susceptible to herbicide contamination from accidental spillage, spray drift and run-off. Herbicide contamination can cause degradation of the quality of aquatic ecosystems and drinking water supplies, which may pose a serious threat to human health. Herbicide contamination can adversely impact non target terrestrial flora and fauna. The use of herbicide is regulated by the Pesticides Act 1999 and TransGrid and its contractors must comply with this Act.

This procedure:

a) Describes the types of herbicides and methodologies that are approved for use by TransGrid staff and contractors for controlling vegetation growth on transmission line easements, substations and project works.

b) Aims to ensure that the appropriate herbicide and methodology is used at each site to effectively control vegetation regrowth and to minimise potential impacts on the environment.

c) Describes the process for the approval and adding of herbicides to the Schedule of Herbicides in TransGrid.

2. Scope

This procedure applies to all TransGrid staff and contactors for herbicide use.

3. Responsibilities

The following TransGrid staff are responsible for the implementation of these procedures:

- Procedure preparation and co-ordination of review of procedure – Manager/Corporate Environment
- Dissemination, implementation and review of procedure – Environment Manager, Mains Managers, Environment Officers and Easement Officers.
- Site inspection and environmental assessments – Environmental Officers or other authorised officers.
- Adherence to procedures including filling out the Vegetation Control Record – all relevant TransGrid staff and contractors.
- Review and endorsement of chemicals for inclusion on TransGrid's Schedule of Approved Herbicides – All members (or delegate) of TransGrid's Environmental Working Group.
- Approving of chemicals for inclusion on TransGrid Schedule of Approved Herbicides – Manager/Corporate Environment

4. Reference Documents

- GD EN G2 118 - TransGrid Schedule of Approved Herbicides (soon to be approved)
- Work Method Statement for Herbicide Application
- GD HS G2 037 Health, Safety and Environment Requirements for Contractors/Tenants (including Site Specific Induction Declaration)
- GD EN G3 023 Waste Management
- GD EN G3 011 – Environmental Training, Authorisation and Assessment
- Regional Emergency Response Procedures (ERPs);
- GM EN G2 010 Noxious Weed Control
- Individual herbicide MSDSs;
- TransGrid's Pesticide Notification Plan
- GD EN G2 010 Environmental Rules for Easements, Underground Cables and Access Tracks
- GD HS G2 040 Accident/Incident Management

- GD EN G3 018 Environmental Incident Notification
- Pesticides Act 1999
- *Poisons and Therapeutic Goods Act 1966*, (
- Waste Classification Guidelines Part 1: Classifying Waste (NSW Department of Environment and Climate Change, 2007).

5. Definitions

Approved herbicide	A chemical agent that is used for vegetation control and/or pest control and is included on the TransGrid Schedule of Approved Herbicides
off target impacts	Unintentional effects on other plants, animals, soils or waterways caused by inappropriate methods of herbicide application.
'pesticide'	an agricultural chemical product (under the Agvet Code) that is used as a means of directly or indirectly destroying or repelling any pest in relation to a plant, place or thing; or destroying a plant; or modifying the physiology of a plant or pest so as to alter its natural development, productivity, quality or reproductive capacity (from Schedule 5, *Pesticides Act 1999*).
Premises	Substation, Depot, Switching station or communication facility surrounded or identified by a security fence (i.e. palisade fence).
Residual herbicide	Residual herbicides are root or leaf absorbed herbicides used for vegetation control that have a period of persistence in the soil and may be used effectively prior to or after the emergence of seasonal weed growth.
S5 poison	a Schedule Five poison under the *Poisons and Therapeutic Goods Act 1966*, that is, a poisonous substance of a dangerous nature commonly used for domestic purposes which should be readily available to the public but which requires caution in handling, use and storage.
S6 poison	a Schedule Six poison under the *Poisons and Therapeutic Goods Act 1966*, that is, a substance which should be readily available to the public for agricultural, pastoral, horticultural, veterinary, photographic or industrial purposes or for the destruction of pests.
surfactant	a substance added to a pesticide formulation to improve its wetting, spreading and dispersability properties
target species	the vegetation species or type that is intended to be controlled by herbicide application or other methodology.

6. Processes

Low toxicity herbicides are used for the control of vegetation growth on TransGrid easements, access tracks, premises, construction sites and TransGrid controlled lands. Only herbicides in GD EN G2 118 - TransGrid Schedule of Approved Herbicides are allowed for use of vegetation control. The schedule shows the active constituents, target species, locations of use and minimum PPE requirements. Surfactant sprays and marker dyes recommended by manufacturers for use with approved herbicides have also been included on this table, as have physical control methods for certain target species.

Herbicides shall only be allowed for use as stated in the GD EN G2 118 - TransGrid Schedule of Approved Herbicides. The use a herbicide for an activity not stated in the schedule can only take place after written approval from the Manager/Corporate Environment or Regional Environmental staff.

Each herbicide must be used strictly in accordance with the manufacturers' recommendations and in accordance with procedures set down in the current Material Safety Data Sheet (MSDS) and on the product label. MSDSs are to be kept in work vehicles and chemical storage areas.

6.1 Herbicide Selection

- Herbicides should be used only when necessary. In some cases, herbicide application may not be appropriate due to the risk of environmental harm or risk to the operator or to the public. Consider the toxicity of the chemical to human, terrestrial and aquatic life and the importance of affected water bodies as drinking water supplies. Select an appropriate control method that minimises these risks;
- Use only registered herbicides which have been approved and listed on the TransGrid Schedule of Approved Herbicides;
- In cases in which a choice of chemicals can be economically applied, the herbicide with the least environmental impact should be selected;
- As far as possible use targeted or narrow spectrum herbicides/selective herbicides (e.g. broadleaf versus broad spectrum);
- All herbicides and equipment shall be safely secured in the back of vehicles during transport to, from and around site, to prevent damage to containers, loss or spillage. All herbicide containers shall be stored in separate self-contained and leak-proof lockable containers.

6.2 Mixing Procedures

1) Care shall be taken when handling any herbicide in order to avoid spillage of the chemical and subsequent loss to the environment and damage to non-targeted vegetation.
2) Give careful consideration to the location of mixing sites. These sites should be:
   - In a bunded area, such as a portable bund
   - located as far as practicable from any watercourse or entry point into the like;
   - sufficiently isolated from plants and animals and well ventilated to prevent off-target damage from fumes;
   - level to enable accurate measuring and avoid spills;
   - supplied with clean water for mixing and washing;
   - Mixing shall be carried out in an area where any spillage that may occur can be easily and quickly contained and neutralised (away from drainage lines, stormwater drains, creeks and water bodies).
3) Always add the herbicide to the required quantity of water and not the other way around.
4) Ensure the manufacturers' mixing proportions and directions for use are strictly adhered to and maintain records of quantities prepared each day.
5) Most herbicides, once mixed, have a limited life so only mix a sufficient quantity to use for one day.
6) Wear adequate protective clothing to prevent contact with skin and inhalation of fumes or dusts. Extreme care should be exercised when handling concentrates and preparing mixes. Replace lids or bungs on partly used containers as soon as they have been used to prevent accidental spillage;
7) Ensure that waste herbicide, empty containers or leftover herbicides are removed from the site and stored or disposed of appropriately.

6.3 Application

6.3.1 General

Adopt control measures that restrict the application of the herbicide only to the target vegetation on transmission line easements, substations and project works. These include:

- Approved herbicides are to be applied exclusively by persons trained/authorised to do so by the relevant regulatory authority (Refer to Section 7);
- Applications should be at the minimum dose and frequency possible (less than or equal to that specified on the label), while achieving effective weed management;
- Select an appropriate application technique for the herbicide to be used and the specific task. For example, a cut and swab technique is more selective than spraying for woody weeds, due to the risk of non-target kill from spraying by wind dispersal or vapour drift;
- Maintain application equipment in proper working order and ensure that it is regularly calibrated. This ensures efficiency by the correct volume of herbicide being used and an even application being achieved;

- Apply the herbicide when it is expected to be most effective and so that the potential for transport and off target damage is minimised. Consider the ambient moisture, temperature and life cycle stage of the target species;
- Avoid applications under adverse weather conditions such as spraying under windy conditions, granule application before high intensity rainfall events, application on water saturated or freshly tilled soil, volatile chemicals during high temperatures;
- Ensure correct coverage on the target plant;
- Avoid unnecessary or excessive applications;
- Herbicides should not be applied less than twelve hours before any rainfall that is forecast by the Bureau of Meteorology. If local conditions deteriorate contrary to the forecast then activities must cease and herbicide application should not commence until conditions are favourable;
- Spray only under calm, low wind conditions. For this reason, spraying is not to be performed in windy conditions (generally considered to be wind velocities 20-29 km/hr (Beaufort scale 4)). Avoid over-spray and spray drift;
- Wherever possible, use a vertical down jet at minimum pressure;
- Use a marker dye to clearly indicate where herbicides have been applied. This will assist the user in avoiding over or under spraying; will make the public aware of the location of application and will assist in dispute resolution regarding the use of herbicides and their effects during large-scale applications. Only marker dyes listed in GD EN G2 118 - TransGrid Schedule of Approved Herbicides are to be used.
- Most herbicides contain a surfactant to overcome the surface tension effect, allowing the herbicide to spread over the surface of plant leaves. Surfactants have been shown to have an adverse effect on frogs. Spraying shall not occur within five metres of any standing or flowing water or in locations where frog calls can be heard or their presence is reasonably suspected.
- Complete a Vegetation Control Record (shown in Attachment 1) at the end of each day of herbicide use. Information regarding site location, vegetation, weather conditions, wind speed and direction, types of herbicide used, application methods, amount used, dilution rates, other agents (mixers, surfactants and dyes) and names of operators shall be completed. These records must be kept for submission to the EPA if required.
- All relevant herbicide Material Safety Data Sheets shall be available during the work.

6.3.2 Application of Herbicides adjacent to waterway or waterbody

Use of herbicides is restricted within 5 metres of a waterway/waterbody. Any herbicide application within 5 metres of a waterway will exceed an environmental trigger under the Environmental Rules for Easements, Underground Cables and Access Tracks GD EN G2 010 and a Minor EIA approved by an E5 officer will be required. Specific controls are defined within the TAMIS EIA, however the following points also need to be followed:

- small applications for specific weeds or to those chemicals registered for use adjacent to watercourses;
- At present the only approved herbicide to be used immediately adjacent to watercourses is the non-residual Roundup Biactive®;
- Avoid loading on or near high run-off areas;
- Do not spray over water;

6.3.3 Spray Pump Applications

- This may be a hand held pressurised container type (backpack spray unit) or a larger vehicle mounted pump driven unit (consisting of a large tank, motorised pump and hose and trigger combinations). The backpack sprayer is suitable for low herbaceous weeds in smaller areas with easy access, while the larger version is most suited to unwanted tree regrowth and bushy weeds under 1.5 meters high over medium sized areas with difficult access.
- Ensure a fine spray and even coverage of at least 90% of foliage for best results. Do not spray herbicides to the point of saturation, when run off commences.
- Where unwanted tree growth exceeds 1.5 metres high, treat either by the cut stump or stem injection methods.

6.3.4 Gas Gun Application

- The L.P. gas powered spray gun delivers accurate measured doses of herbicide for vegetation growth over large areas.
- The gas gun is suited for treatment of unwanted tree growth under 1.5 metres high and bushy weeds.
- Ensure a fine even spray and coverage of at least 90% of foliage for best results. Do not spray herbicide to the point of saturation (i.e. when run-off commences).
- Where unwanted tree growth exceeds 1.5 metres high, treat either by the cut stump or stem injection methods.

6.3.5 Cut Stump Method

- This method is recommended for unwanted tree growth up to 10cm trunk diameter at ground level.
- Cut the tree growth close to the ground using safe chainsaw tree felling techniques. Once the tree has been felled, immediately wet the outer growth rings of the stump surface thoroughly with a concentrated herbicide solution. Only the outer cambium layer of the tree contains living tissue, just under the bark – the middle section of the stump is dead heartwood. Use only a small hand held spray applicator or paintbrush for this purpose and do not over-apply herbicide.
- The herbicide should be applied to the cut stump surface as soon as possible after cutting. Within 15 seconds the stump will begin sealing itself or drying off which dramatically reduces the effectiveness of the application.
- Remove any branches remaining on the cut stump, as they are likely sources of regrowth. Treat these cut branches in the same manner as above.

6.3.6 Stem Injection Method

- This method is recommended for unwanted tree growth greater than 10cm trunk diameter at ground level.
- Make cuts at a slight downwards angle with a narrow-bladed axe through the bark into the sapstream. Leave the axe in the cut and immediately apply the herbicide down the axe-blade to ensure the full dose enters the sapstream. This is necessary because the plant can seal the cut quickly, thus barring the herbicide penetrating into the sapstream.
- Cuts can be spaced at 10-13cm centres around the trunk.

6.3.7 Bush Regeneration Method

- If the environmental site assessment has shown the presence of critical habitat, threatened species or endangered ecological communities, it may be most appropriate to carry out vegetation control using minimal impact or 'bush regeneration' methodology.
- Bush regeneration employs the principles of 'the Bradley Method', where weeds are removed by hand tools or treated in-situ by 'cut stump' or 'stem injection' methods.
- Bush regeneration methods are applied over long periods of time to allow for gradual changes in vegetation species and allow for native animals to seek new habitat.
- Bush regeneration methods also encourage the regrowth of a maximum diversity of native species (some selective thinning of native regrowth may be required) and minimum or very selective use of low-toxicity herbicides.

6.3.8 Use of Boom Spray

Use of a boom spray system to apply herbicides to vegetation is a restricted activity. Any boom spray system to apply herbicides to vegetation will exceed an environmental trigger under the Environmental Rules for Easements, Underground Cables and Access Tracks (GD EN G2 010) and a Minor EIA approved by an E5 officer will be required. Specific controls are defined within the TAMIS EIA, however the following points also need to be considered before the use of boom spraying is undertaken:

- Review of the sprayer and equipment specifications to ensure that they meet the requirements of the work;
- Nozzle type, nozzle spacing, nozzle pattern angle;
- Travel speed; and

- Spray release height.

6.3.9 Monitoring

- Each location shall be inspected approximately 3-4 weeks after herbicide application to confirm the vegetation control objectives have been met and that there have been no unintended consequences. If there have been unintended consequences, refer to Section 6.6 for information on raising an incident.
- Follow up applications of herbicide may be required if the target plants have survived. If so, follow this procedure as before. A review of herbicide dilution rates or surfactant types may be required

6.4 Residual Herbicides

Residual herbicides are root or leaf absorbed herbicides used for vegetation control that have a period of persistence in the soil and may be used effectively prior to or after the emergence of seasonal weed growth.

The period of persistence in the soil may be short term (up to three months), medium term (3 to 12 months) or long term (over 12 months). The residual life may be dependent on factors such as the application rate, rainfall, soil type, soil acidity and temperature. Many residual herbicides are root absorbed, translocated herbicides that require substantial rainfall for incorporation into the soil profile. Residual herbicides include the triazine chemicals (simazine and atrazine).

The use of residual herbicides by TransGrid and its contractors is limited to use in Premises and Substation Construction Projects. Residual herbicides are not to be used on easements, access tracks or TransGrid property outside the premise fence

6.4.1 Use in premises (Substation or Depot) management

Residual herbicides may be used around buildings and depots if not within 20 metres of an external (to the premises) surface drainage channel or watercourse, or in a natural wetland or floodplain.

If the application of residual herbicides is proposed outside the restrictions specified above a proposal shall be submitted to the Regions Environmental Manager or Officer for approval specifying:

- the reason for use of residual herbicide;
- location of drainage lines or watercourses in relation to the proposed area of spraying;
- proposed timing of spraying and application rate;
- proposed measures to manage risk of off-target impacts.

6.5 Disposal of Containers, Unused Herbicide and Contaminated Soil

The herbicides listed in GD EN G2 118 - TransGrid Schedule of Approved Herbicides. are nominated as either S5 and S6 poisons, and as such are classified as hazardous waste under the Waste Classification Guidelines Part 1: Classifying Waste (NSW Department of Environment and Climate Change, 2007).

Mixing shall only occur in empty containers. Unused herbicide shall be reused where possible. Empty containers shall be triple washed or pressure washed before recycling or disposal, as appropriate (as per the relevant MSDS). If this is not possible, containers, waste herbicide, wash water, shall be disposed of in an approved landfill site. Soils which have been contaminated by significant quantities of herbicides shall also be disposed of in an approved landfill site with the proper authorisation from the landfill manager and the NSW EPA, if required.

Waste shall be disposed of in accordance with GD EN G3 023 – Waste Management.

6.6 Incidents

All incidents must be reported in the Incident Notification System on TransNet. Refer to procedure GD EN G3 018 Environmental Incident Notification for more information on incident notification and investigation.

6.7 Adding and Approving Herbicides

For a herbicide to be added to the schedule it must be thoroughly researched for suitability, safety and effect on the environment. It must be established that the herbicide targets the identified vegetation only, and that vegetation and surrounding ecosystems that are not required to be controlled are not affected if applied appropriately. As part of the research, the current MSDS must be attained.

The following must be identified:

- colour rating; red, amber, green
- The herbicide classification (e.g. hazardous)
- Health hazards and PPE required
- Emergency requirements (e.g. spillage, environment, fire and explosion, extinguishing)
- Safe handling; storage, waste disposal and transport
- Physical and chemical properties
- Stability and reactivity
- Regulatory Information: (e.g. poison classification)

The National Registration Authority for Agricultural and Veterinary Chemicals in Canberra operates the Australian system that evaluates, registers and regulates agricultural (or veterinary) chemicals.

The Australian Herbicides and Veterinary Medicines Authority (APVMA) maintain a database (PUBCRIS Registered Product Search Engine) of details on agricultural chemical products, which are registered in Australia. For a chemical to be considered for use by TransGrid staff and contractors the Australian Herbicides and Veterinary Medicines Authority website **MUST** be accessed and the herbicide must be registered for use in Australia. The database can be accessed at:

http://services.apvma.gov.au/PubcrisWebClient

For general enquires contact the APVMA at: (02) 6272 5852 or visit the contacts list at:

http://www.apvma.gov.au/about_us/contact.shtml

The current MSDS, a copy of the product summary from the APVMA website and any further information is to be forwarded to the members of TransGrid's Environmental Working Group. The members of the Environmental Working Group will review the product and shall establish whether the herbicide is appropriate for the identified use. If the review is favourable they will forward their endorsement of the product to the Manager/Corporate Environment for approval and inclusion on the TransGrid Schedule of Approved Herbicides. The Environment Working Group is to be notified when a herbicide is added to GD EN G2 118 - TransGrid Schedule of Approved Herbicides.

7. Qualifications Required for Applying Herbicide

To apply herbicides or herbicides on behalf of TransGrid staff and contractors are required to hold relevant qualifications and/or licenses for NSW and or the ACT. In NSW, all employees or contractors carrying out herbicide application shall have completed a minimum of a NSW TAFE ChemCert Farm Chemicals or equivalent.

In the ACT, commercial use of herbicide requires environmental authorisation under the Protection of the Environment 1997 Act. A list of Authorised Pest & Weed Control Operators in the ACT is available on the ACT Department of Environment, Climate Change, Energy and Water located at http://www.environment.act.gov.au

The contractor should have an established OH&S and EMS system.

8. Use of Herbicides for Project Works

For any project work, the Environmental impact assessment should include the preparation of a Contractor's Environmental Management Plan (Contractor's EMP) or, for minor works, a Work Plan (land management works) by the Contractor and/or TransGrid staff. The Contractor's EMP or Work Plan should include a weed management plan showing: environmentally significant sites (which could include: areas containing threatened species, drainage lines and watercourses in relation to the proposed work area), proposed timing of spraying, and application rates. The Contractor's EMP or Work Plan is approved by the project manager. It should be ensured that the work plan is in accordance with this procedure. Further advice may be obtained from local environmental representatives or the Corporate Environment Group.

9. Implementation and Verification Plan

- Email to all staff regarding the update of the procedure
- Inclusion of a Herbicides page on TransNet

10. Attachments

Attachment 1 – Vegetation Control Record

11. Amendments from Previous Issue

- Approved Herbicides Used table has been removed from the procedure and is now a separate document
- Process for adding and approving herbicides has been included
- Herbicide use for projects has been included
- Document renumbered and reformatted

Attachment 1 - Vegetation Control Record

Transmission Line		**Structure (s)**		**Date of Application**	
Property:	(details: address, LGA, Lot/DP and other identifying information)				
Target Species:					
Description of where herbicide is applied on property (may draw map if desired)					

1. Contact Details

	Name	**Address**	**Contact Numbers** (Tel / fax / e-mail)
Owner			
Occupier			
Supervisor (TG)			
Contractor			

2. Constraints

Previous Treatment							Last Treatment Date	
Industrial		Residential		Agricultural		Y / N	Reserve (National Parks, Forests, Parks and Reserves)	
				Crop / Grazing	Type			

3. Weather

Wind Direction (circle)	Wind Speed (circle one)		Temperature		Relative Humidity (%)
N NW NE W + E SW SE S	Increasing / Steady / Decreasing / Variable		Temperature:	°C	
	Speed:	Km/hour	Type of Day:		Comment:
	Beaufort Scale (1-8)		Rainfall Predicted	Y / N	

Guidance on Beaufort Scale: The following is from the EPA's Industry Guidance Fact Sheet "Pesticide Record Keeping – Public Authorities"

This modified Beaufort Scale is provided to assist in determining the wind speed for pesticide record keeping purposes.

Beaufort or force number (km/hr)	Wind Speed (km/hr)	Description
0	Less than 1.6	Calm: smoke will rise vertically
1	1.6 – 4.8	Weather vane is inactive, rising smoke drifts
2	6.4 – 11.3	Leaves rustle, can feel wind on your face, weather vane is inactive
3	12.9 – 19.3	Leaves and twigs move around. Light weight flags extend.
4	20.9 – 29.0	Moves thin branches, raises dust and paper.
5	30.6 – 38.6	Small trees move or sway.

This table only includes the lower wind speed portion of the Beaufort Scale. The full Beaufort Scale also includes higher force numbers which describe stronger wind speeds.

4. Treatment

Full Name of Pesticide (incl Herbicide)	Quantity (Volume) (L)	Dilution (mL/L)	Rate of Application (Area - ha)	Time of Application		Method of Application			Amount of Spray Mix Used (L)
				Start	Finish	Hand Gun	Spot Spray	Boom	
Pesticide (incl herbicide):									
Wetting Agent:									
Other:									

Completed by: _____ Staff / Contractor: _____

Date: _____ _____

Service #: _____ _____

Appendix L Noxious Weeds LGA Listings

Noxious weed declarations

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Noxious weed declarations for Inverell Shire Council

The following weeds are declared noxious in the control area of Inverell Shire Council:

Weed	Class	Legal requirements
African boxthorn [Lycium ferocissimum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
African feathergrass [Pennisetum macrourum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium runcinatum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium thellungii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Alligator weed [Alternanthera philoxeroides]	2	Whole of NSW except the local control authorities listed as control class 3 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Anchored water hyacinth [Eichhornia azurea]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Annual ragweed [Ambrosia artemisiifolia]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Arrowhead [Sagittaria montevidensis]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Artichoke thistle [Cynara cardunculus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Athel pine [Tamarix aphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Bear-skin fescue [Festuca gautieri]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Black knapweed [Centaurea nigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Blackberry [Rubus fruticosus aggregate species] except cultivars Black satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem, Thornfree	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Bridal creeper [Asparagus asparagoides]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration

Broomrapes [Orobanche species] Includes all Orobanche species except the native O. cernua variety australiana and O. minor	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Burr ragweed [Ambrosia confertiflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cabomba [All Cabomba species except C. furcata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cayenne snakeweed [Stachytarpheta cayennensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Chilean needle grass [Nassella neesiana]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Chinese violet [Asystasia gangetica subspecies micrantha]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Clockweed [Gaura parviflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Corn sowthistle [Sonchus arvensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Dodder [Cuscuta species] Includes All Cuscuta species except the native species C. australis, C. tasmanica and C. victoriana	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
East Indian hygrophila [Hygrophila polysperma]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Espartillo [Amelichloa brachychaeta, Amelichloa caudata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Eurasian water milfoil [Myriophyllum spicatum]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Fine-bristled burr grass [Cenchrus brownii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Fountain grass [Pennisetum setaceum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Gallon's curse [Cenchrus biflorus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Galvanised burr [Sclerolaena birchii]	4	The plant must be controlled where it impacts on normal agricultural practices including cropping and pasture management
Giant Parramatta grass [Sporobolus fertilis]	3	The plant must be fully and continuously suppressed and destroyed
Glaucous starthistle [Carthamus glaucus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

Golden thistle [Scolymus hispanicus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Green cestrum [Cestrum parqui]	3	The plant must be fully and continuously suppressed and destroyed
Harrisia cactus [Harrisia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Hawkweed [Hieracium species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Horsetail [Equisetum species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hymenachne [Hymenachne amplexicaulis]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Italian bugloss [Echium species]		See Paterson's curse, Vipers bugloss, Italian bugloss
Karoo thorn [Acacia karroo]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Kochia [Bassia scoparia] except Bassia scoparia subspecies trichophylla	1	except B.scoparia subspecies trichophylla The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lagarosiphon [Lagarosiphon major]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lantana [Lantana species]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Leafy elodea [Egeria densa]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Lippia [Phyla canescens]	4	The plant must not be sold, propagated or knowingly distributed by any person other than a person involved in hay or lucerne production. The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. This is an All of NSW declaration
Long-leaf willow primrose [Ludwigia longifolia]	4	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Mesquite [Prosopis species]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Mexican feather grass [Nassella tenuissima]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mexican poppy [Argemone mexicana]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Miconia [Miconia species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mimosa [Mimosa pigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration

Mossman River grass [Cenchrus echinatus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Mother-of-millions [Bryophyllum species and hybrids]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Nodding thistle [Carduus nutans]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Pampas grass [Cortaderia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Parkinsonia [Parkinsonia aculeata]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Parthenium weed [Parthenium hysterophorus]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Paterson's curse, Vipers bugloss, Italian bugloss [Echium species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Pond apple [Annona glabra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly acacia [Acacia nilotica]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly pear [Cylindropuntia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Prickly pear [Opuntia species except O. ficus-indica]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Red rice [Oryza rufipogon]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Rhus tree [Toxicodendron succedaneum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority This is an All of NSW declaration
Rubbervine [Cryptostegia grandiflora]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Sagittaria [Sagittaria platyphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Salvinia [Salvinia molesta]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Senegal tea plant [Gymnocoronis spilanthoides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Serrated tussock [Nassella trichotoma]	3	The plant must be fully and continuously suppressed and destroyed and the

		plant may not be sold, propagated or knowingly distributed
Siam weed [Chromolaena odorata]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Silverleaf nightshade [Solanum elaeagnifolium]	3	The plant must be fully and continuously suppressed and destroyed
Smooth-stemmed turnip [Brassica barrelieri subspecies oxyrrhina]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Soldier thistle [Picnomon acarna]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Spotted knapweed [Centaurea stoebe subspecies micranthos]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
St. John's wort [Hypericum perforatum]	3	The plant must be fully and continuously suppressed and destroyed
Sweet briar [Rosa rubiginosa]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Texas blueweed [Helianthus ciliaris]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Water caltrop [Trapa species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water hyacinth [Eichhornia crassipes]	2	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water lettuce [Pistia stratiotes]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water soldier [Stratiotes aloides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Willows [Salix species] Includes all Salix species except S. babylonica, S. x reichardtii, S. x calodendron	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Witchweed [Striga species] Striga species except the native Striga parviflora	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow burrhead [Limnocharis flava]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow nutgrass [Cyperus esculentus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

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Noxious weed declarations

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Noxious weed declarations for Far North Coast County Council

Note: this control area includes the local council areas of **Ballina, Byron, Kyogle, Lismore, Richmond Valley, Tweed.**

The following weeds are declared noxious in the control area of Far North Coast County Council:

Weed	Class	Legal requirements
African feathergrass [Pennisetum macrourum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium runcinatum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium thellungii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Alligator weed [Alternanthera philoxeroides]	2	Whole of NSW except the local control authorities listed as control class 3 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Anchored water hyacinth [Eichhornia azurea]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Annual ragweed [Ambrosia artemisiifolia]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Arrowhead [Sagittaria montevidensis]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Artichoke thistle [Cynara cardunculus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Athel pine [Tamarix aphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Bathurst/Noogoora/Hunter/South American/Californian/cockle burr [Xanthium species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Bear-skin fescue [Festuca gautieri]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Bitou bush [Chrysanthemoides monilifera subspecies rotundata]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Black knapweed [Centaurea nigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Blackberry [Rubus fruticosus aggregate species] except cultivars Black satin, Chehalem, Chester	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control

Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem, Thornfree		authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Boneseed [Chrysanthemoides monilifera subspecies monilifera]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Bridal creeper [Asparagus asparagoides]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Broad-leaf pepper tree [Schinus terebinthifolius]	3	The plant must be fully and continuously suppressed and destroyed
Broomrapes [Orobanche species] Includes all Orobanche species except the native O. cernua variety australiana and O. minor	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Burr ragweed [Ambrosia confertiflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cabomba [All Cabomba species except C. furcata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Camphor laurel [Cinnamomum camphora]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Cayenne snakeweed [Stachytarpheta cayennensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Chilean needle grass [Nassella neesiana]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Chinese celtis [Celtis sinensis]	3	The plant must be fully and continuously suppressed and destroyed
Chinese tallow tree [Triadica sebifera]	3	The plant must be fully and continuously suppressed and destroyed
Chinese violet [Asystasia gangetica subspecies micrantha]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Clockweed [Gaura parviflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Columbus grass [Sorghum x almum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Corn sowthistle [Sonchus arvensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Crofton weed [Ageratina adenophora]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Dodder [Cuscuta species] Includes All Cuscuta species except the native species C. australis, C. tasmanica and C. victoriana	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
East Indian hygrophila [Hygrophila polysperma]	1	The plant must be eradicated from the land and the land must be kept free of the plant

		This is an All of NSW declaration
English broom [Cytisus scoparius]		See Scotch broom
Espartillo [Amelichloa brachychaeta, Amelichloa caudata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Eurasian water milfoil [Myriophyllum spicatum]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Fine-bristled burr grass [Cenchrus brownii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Fountain grass [Pennisetum setaceum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Gallon's curse [Cenchrus biflorus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Giant Parramatta grass [Sporobolus fertilis]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Giant rat's tail grass [Sporobolus pyramidalis]	3	The plant must be fully and continuously suppressed and destroyed
Glaucous starthistle [Carthamus glaucus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Golden thistle [Scolymus hispanicus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Green cestrum [Cestrum parqui]	3	The plant must be fully and continuously suppressed and destroyed
Groundsel bush [Baccharis halimifolia]	3	The plant must be fully and continuously suppressed and destroyed
Hackleberry, Celtis [Celtis sinensis]		See Chinese celtis
Harrisia cactus [Harrisia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Hawkweed [Hieracium species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Honey locust [Gleditsia triacanthos]	3	The plant must be fully and continuously suppressed and destroyed
Horsetail [Equisetum species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hygrophila [Hygrophila costata]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Hymenachne [Hymenachne amplexicaulis]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Johnson grass [Sorghum halepense]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Karoo thorn [Acacia karroo]	1	The plant must be eradicated from the land and the land must be kept free of the plant

		This is an All of NSW declaration
Kochia [Bassia scoparia] except Bassia scoparia subspecies trichophylla	1	except B.scoparia subspecies trichophylla The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Kudzu [Pueraria lobata]	3	The plant must be fully and continuously suppressed and destroyed
Lagarosiphon [Lagarosiphon major]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lantana [Lantana species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Lantana [Lantana species]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Leafy elodea [Egeria densa]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Lippia [Phyla canescens]	4	The plant must not be sold, propagated or knowingly distributed by any person other than a person involved in hay or lucerne production. The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. This is an All of NSW declaration
Long-leaf willow primrose [Ludwigia longifolia]	4	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Mexican feather grass [Nassella tenuissima]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mexican poppy [Argemone mexicana]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Miconia [Miconia species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mimosa [Mimosa pigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mistflower [Ageratina riparia]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Mossman River grass [Cenchrus echinatus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Mysore thorn [Caesalpinia decapetala]	3	The plant must be fully and continuously suppressed and destroyed
Nodding thistle [Carduus nutans]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Noogoora burr [Xanthium species]		See Bathurst/Noogoora/Hunter/South American/Californian/cockle burr
Pampas grass [Cortaderia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority

Parthenium weed [Parthenium hysterophorus]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Pond apple [Annona glabra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly acacia [Acacia nilotica]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly pear [Cylindropuntia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Prickly pear [Opuntia species except O. ficus-indica]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Privet (Broad-leaf) [Ligustrum lucidum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Privet (Narrow-leaf/Chinese) [Ligustrum sinense]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Red rice [Oryza rufipogon]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Rhus tree [Toxicodendron succedaneum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority This is an All of NSW declaration
Rubbervine [Cryptostegia grandiflora]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Sagittaria [Sagittaria platyphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Salvinia [Salvinia molesta]	3	The plant must be fully and continuously suppressed and destroyed
Scotch broom [Cytisus scoparius]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Senegal tea plant [Gymnocoronis spilanthoides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Serrated tussock [Nassella trichotoma]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Siam weed [Chromolaena odorata]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration

Smooth-stemmed turnip [Brassica barrelieri subspecies oxyrrhina]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Soldier thistle [Picnomon acarna]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Spiny burrgrass [Cenchrus incertus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Spiny burrgrass [Cenchrus longispinus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Spotted knapweed [Centaurea stoebe subspecies micranthos]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
St. John's wort [Hypericum perforatum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Texas blueweed [Helianthus ciliaris]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Water caltrop [Trapa species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water hyacinth [Eichhornia crassipes]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Water hyacinth [Eichhornia crassipes]	2	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water lettuce [Pistia stratiotes]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water soldier [Stratiotes aloides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Willows [Salix species]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Witchweed [Striga species] Striga species except the native Striga parviflora	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow bells [Tecoma stans]	3	The plant must be fully and continuously suppressed and destroyed
Yellow burrhead [Limnocharis flava]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow nutgrass [Cyperus esculentus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

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Noxious weed declarations

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Noxious weed declarations for Tenterfield Shire Council

The following weeds are declared noxious in the control area of Tenterfield Shire Council:

Weed	Class	Legal requirements
African boxthorn [Lycium ferocissimum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
African feathergrass [Pennisetum macrourum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium runcinatum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [Sisymbrium thellungii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Alligator weed [Alternanthera philoxeroides]	2	Whole of NSW except the local control authorities listed as control class 3 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Anchored water hyacinth [Eichhornia azurea]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Annual ragweed [Ambrosia artemisiifolia]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Arrowhead [Sagittaria montevidensis]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Artichoke thistle [Cynara cardunculus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Athel pine [Tamarix aphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Bathurst/Noogoora/Hunter/South American/Californian/cockle burr [Xanthium species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Bear-skin fescue [Festuca gautieri]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Black knapweed [Centaurea nigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Blackberry [Rubus fruticosus aggregate species] except cultivars Black satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness,	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed

Murrindindi, Silvan, Smoothstem, Thornfree		This is an All of NSW declaration
Bridal creeper [Asparagus asparagoides]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Broomrapes [Orobanche species] Includes all Orobanche species except the native O. cernua variety australiana and O. minor	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Burr ragweed [Ambrosia confertiflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cabomba [All Cabomba species except C. furcata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cayenne snakeweed [Stachytarpheta cayennensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Chilean needle grass [Nassella neesiana]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Chinese violet [Asystasia gangetica subspecies micrantha]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Clockweed [Gaura parviflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Columbus grass [Sorghum x almum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Corn sowthistle [Sonchus arvensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Crofton weed [Ageratina adenophora]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Dodder [Cuscuta species] Includes All Cuscuta species except the native species C. australis, C. tasmanica and C. victoriana	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
East Indian hygrophila [Hygrophila polysperma]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
English broom [Cytisus scoparius]		See Scotch broom
Espartillo [Amelichloa brachychaeta, Amelichloa caudata]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Eurasian water milfoil [Myriophyllum spicatum]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Fine-bristled burr grass [Cenchrus brownii]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Fountain grass [Pennisetum setaceum]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

Gallon's curse [Cenchrus biflorus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Giant Parramatta grass [Sporobolus fertilis]	3	The plant must be fully and continuously suppressed and destroyed
Glaucous starthistle [Carthamus glaucus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Golden dodder [Cuscuta campestris]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Golden thistle [Scolymus hispanicus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Green cestrum [Cestrum parqui]	3	The plant must be fully and continuously suppressed and destroyed
Groundsel bush [Baccharis halimifolia]	3	The plant must be fully and continuously suppressed and destroyed
Harrisia cactus [Harrisia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Hawkweed [Hieracium species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hemlock [Conium maculatum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Horsetail [Equisetum species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hymenachne [Hymenachne amplexicaulis]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Italian bugloss [Echium species]		See Paterson's curse, Vipers bugloss, Italian bugloss
Johnson grass [Sorghum halepense]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Karoo thorn [Acacia karroo]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Kochia [Bassia scoparia] except Bassia scoparia subspecies trichophylla	1	except B.scoparia subspecies trichophylla The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lagarosiphon [Lagarosiphon major]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lantana [Lantana species]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Leafy elodea [Egeria densa]	4	The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Lippia [Phyla canescens]	4	The plant must not be sold, propagated or knowingly distributed by any person other than a person involved in hay or lucerne production. The growth and spread of the plant must be controlled according to the

		measures specified in a management plan published by the local control authority. This is an All of NSW declaration
Long-leaf willow primrose [Ludwigia longifolia]	4	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant may not be sold, propagated or knowingly distributed. This is an All of NSW declaration
Long-style feather grass [Pennisetum villosum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Mesquite [Prosopis species]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Mexican feather grass [Nassella tenuissima]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mexican poppy [Argemone mexicana]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Miconia [Miconia species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mimosa [Mimosa pigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mossman River grass [Cenchrus echinatus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Mother-of-millions [Bryophyllum species and hybrids]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Nodding thistle [Carduus nutans]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Noogoora burr [Xanthium species]		See Bathurst/Noogoora/Hunter/South American/Californian/cockle burr
Pampas grass [Cortaderia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Parkinsonia [Parkinsonia aculeata]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Parthenium weed [Parthenium hysterophorus]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Paterson's curse, Vipers bugloss, Italian bugloss [Echium species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Pond apple [Annona glabra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly acacia [Acacia nilotica]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly pear [Cylindropuntia species]	4	The growth and spread of the plant must be controlled according to the

		measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Prickly pear [Opuntia species except O. ficus-indica]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Privet (Broad-leaf) [Ligustrum lucidum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Privet (Narrow-leaf/Chinese) [Ligustrum sinense]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Red rice [Oryza rufipogon]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Rhus tree [Toxicodendron succedaneum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority This is an All of NSW declaration
Rubbervine [Cryptostegia grandiflora]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Sagittaria [Sagittaria platyphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Salvinia [Salvinia molesta]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Scotch broom [Cytisus scoparius]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Senegal tea plant [Gymnocoronis spilanthoides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Serrated tussock [Nassella trichotoma]	3	The plant must be fully and continuously suppressed and destroyed and the plant may not be sold, propagated or knowingly distributed
Siam weed [Chromolaena odorata]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Silverleaf nightshade [Solanum elaeagnifolium]	3	The plant must be fully and continuously suppressed and destroyed
Smooth-stemmed turnip [Brassica barrelieri subspecies oxyrrhina]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Soldier thistle [Picnomon acarna]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Spiny burrgrass [Cenchrus incertus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control

		authority and the plant may not be sold, propagated or knowingly distributed
Spiny burrgrass [Cenchrus longispinus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Spotted knapweed [Centaurea stoebe subspecies micranthos]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
St. John's wort [Hypericum perforatum]	3	The plant must be fully and continuously suppressed and destroyed
Sweet briar [Rosa rubiginosa]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Texas blueweed [Helianthus ciliaris]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Water caltrop [Trapa species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water hyacinth [Eichhornia crassipes]	3	The plant must be fully and continuously suppressed and destroyed
Water hyacinth [Eichhornia crassipes]	2	Whole of NSW except the local control authorities listed as control class 3 or 4 The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water lettuce [Pistia stratiotes]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water soldier [Stratiotes aloides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Willows [Salix species] Includes all Salix species except S. babylonica, S. x reichardtii, S. x calodendron	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Witchweed [Striga species] Striga species except the native Striga parviflora	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow burrhead [Limnocharis flava]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow nutgrass [Cyperus esculentus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

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