**APPENDIX 1**

**FLORA AND FAUNA DATA**

**Table 1.1:** Threatened species (flora and terrestrial fauna) recorded within 10 kilometres of the subject site and their likelihood to occur. OEH Wildlife Atlas database, October 2016.

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| Animalia | Amphibia | Myobatrachidae | *Crinia tinnula* Wallum Froglet | Vulnerable | - | Found only in acid paperbark swamps and sedge swamps. | 39 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Amphibia | Hylidae | *Litoria brevipalmata* Green-thighed Frog | Vulnerable | - | Occurs in range of forested habitats where surface water gathers after rain. | 2 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Amphibia | Hylidae | *Litoria olongburensis* Olongburra Frog | Vulnerable | Vulnerable | An 'acid' frog confined to coastal sandplain wallum swamps. | 20 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Reptilia | Cheloniidae | *Caretta caretta* Loggerhead Turtle | Endangered | Endangered | Terrestrial habitat restricted to tropical beaches. | 5 | No suitable habitat on site. | None. | Not required. |
| Animalia | Reptilia | Cheloniidae | *Chelonia mydas* Green Turtle | Vulnerable | Vulnerable | Terrestrial habitat restricted to marine beaches. | 14 | No suitable habitat on site. | None. | Not required. |
| Animalia | Reptilia | Cheloniidae | *Eretmochelys imbricata* Hawksbill Turtle | - | Vulnerable | Terrestrial habitat restricted to marine beaches. | 3 | No suitable habitat on site. | None. | Not required. |
| Animalia | Reptilia | Elapidae | *Cacophis harriettae* White-crowned Snake | Vulnerable | - | Occurs near coastal areas on low to mid elevations of dry eucalypt forest and woodland. Found particularly in areas with a well-developed litter layer and fallen timber to forage for their prey. | 3 | Marginally suitable habitat on site. | Records are few and all south of the Clarence River.<br>Low. | Not required. |
| Animalia | Aves | Casuariidae | *Dromaius novaehollandiae* Emu | Endangered Population | - | Occurs in predominantly open lowland habitats, including grassland, heathland, shrubland, woodland, forest, swamp and sedge communities, plantations, open farmland and occasionally littoral rainforest. | 267 | Suitable habitat on site. | Scats observed on site. | Further impact assessment required. |
| Animalia | Aves | Phaethontidae | *Phaethon lepturus* White-tailed Tropicbird | - | Migratory | Migratory species found over pelagic waters feeding on small fish. | 1 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Aves | Phaethontidae | *Phaethon rubricauda* Red-tailed Tropicbird | Vulnerable | Migratory | Terrestrial habitat confined to oceanic islands. | 1 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Aves | Apodidae | *Apus pacificus* Fork-tailed Swift | - | Migratory | Almost exclusively aerial, flying over most habitat types. Arrive from Siberia in spring and depart in autumn. Feed on edge of low pressure systems. Threats to this species in Australia are negligible. | 5 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Aves | Apodidae | *Hirundapus caudacutus* White-throated Needletail | - | Migratory | Non-breeding population migrates from Asia in spring and departs autumn along either side of Great Dividing Range. Most of its time spent feeding on the wing, high along storm fronts. Roosts infrequently in terrestrial habitats and terrestrial habitat largely irrelevant. | 31 | Suitable habitat on site. | Observed flying overhead during survey.<br>Low likelihood to use terrestrial habitats of the subject site. | Not required. |
| Animalia | Aves | Diomedeidae | *Thalassarche melanophris* Black-browed Albatross | Vulnerable | Vulnerable | Terrestrial habitat confined to offshore islands. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Procellariidae | *Ardenna carneipes* Flesh-footed Shearwater | Vulnerable | Migratory | Terrestrial habitat confined to Lord Howe Island. | 6 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Procellariidae | *Ardenna pacificus* Wedge-tailed Shearwater | - | Migratory | Breeds on offshore islands along NSW coast. Absent from NSW from May to August. | 10 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Procellariidae | *Ardenna tenuirostris* Short-tailed Shearwater | - | Migratory | Winters in the North Pacific and migrates in very large flocks south to establish massive breeding colonies off the southern and south-eastern coasts of Australia. | 4 | No suitable habitat on site. | None. | Not required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| Animalia | Aves | Procellariidae | *Macronectes giganteus* Southern Giant Petrel | Endangered | Endangered | Terrestrial habitat confined to offshore islands just north of the Antarctic circle. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Fregatidae | *Fregata ariel* Lesser Frigatebird | - | Migratory | A migratory species found on remote islands and breeds in bushes, mangroves and on the ground. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Fregatidae | *Fregata minor* Great Frigatebird | - | Migratory | A migratory species found in tropical waters and breeding in mangroves and bushes. | 3 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Ciconiidae | *Ephippiorhynchus asiaticus* Black-necked Stork | Endangered | - | Inhabits permanent freshwater wetlands | 89 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Ardeidae | *Ardea ibis* Cattle Egret | - | Migratory | Widespread, common and expanding. Occurs in grasslands, wooded lands and wetlands. Most commonly found foraging with livestock. Roosts in trees in or near lakes and swamps. Breeds in colonies in wooded swamps. | 14 | No suitable habitat on site. | Recorded in the local area in suitable habitat during survey. Low to no likelihood to occur. | Not required. |
| Animalia | Aves | Ardeidae | *Egretta sacra* Eastern Reef Egret | - | Migratory | Lives on exposed reefs, rocky shores, beaches, mudflats, islands. Roosts and nests in woodland, scrub adjacent to beaches. | 2 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Ardeidae | *Ixobrychus flavicollis* Black Bittern | Vulnerable | - | Occurs in freshwater and estuarine wetlands. | 4 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Threskiornithidae | *Plegadis falcinellus* Glossy Ibis | - | Migratory | Frequents swamps and lakes throughout much of the Australian mainland. Breeds in colonies with other waterbirds; nests in trees or shrubs growing in water. | 7 | No suitable habitat on site. | Low to none. | Not required. |
| Animalia | Aves | Accipitridae | *Circus assimilis* Spotted Harrier | Vulnerable | - | Found in tropical and temperate open wooded country, particularly in arid and semi-arid areas. Partly nomadic, in response to local conditions. Hunts low over the ground, favoured prey are ground birds; will also take mice, rats, rabbits and lizards. | 1 | No suitable habitat on site. | Low. | Not required. |
| Animalia | Aves | Accipitridae | *Erythrotriorchis radiates* Red Goshawk | Critically Endangered | Vulnerable | Inhabit 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. Breeding habitat within 1km of permanent water, often adjacent to rivers or clearings. Usually one of the tallest trees is selected for the nest location. | 1 | Suitable potential habitat on site. | Only 1 record from the broader study area, dating from 1987, 5 km west of Iluka. Low likelihood to occur. | Not required. |
| Animalia | Aves | Accipitridae | *Haliaeetus leucogaster* White-bellied Sea-Eagle | Vulnerable (preliminary determination) | Migratory | Most commonly seen foraging over water bodies or near coastal waters; will occasionally forage over open country for carrion. Highly mobile and travels long distances. Nests and roosts high in trees in well-timbered country. | 125 | Marginally suitable potential nesting habitat on site. | Large number of records (>120) in the broader study area. Observed nesting in golf course to the north of the subject site. Moderate likelihood to occur on the subject site. | Further impact assessment required. |
| Animalia | Aves | Accipitridae | *Hamirostra melanosternon* Black-breasted Buzzard | Vulnerable | - | Lives in a range of inland habitats, especially along timbered watercourses and in areas | 1 | Marginally suitable potential foraging habitat on site. | Only 1 record from the broader study area, dating from 1981, in Iluka township. | Not required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| | | | | | | with less than 500mm of rainfall. Specializes in eating large eggs, including emu eggs. | | | Low likelihood to occur. | |
| Animalia | Aves | Accipitridae | *Lophoictinia isura*<br>Square-tailed Kite | Vulnerable | - | Found in timbered habitats with a particular preference for timbered watercourses. | 6 | Suitable potential habitat on site. | Only 6 records were identified with the closest being 3km north east of the subject site in 1984 and the most recent being 8km west of the subject site in 1991.<br>This species was observed nearby during survey.<br>High likelihood to occur. | Further impact assessment required. |
| Animalia | Aves | Accipitridae | *Pandion cristatus*<br>Eastern Osprey | Vulnerable | - | Favours coastal areas and requires an extensive area of open fresh, brackish or saline water for foraging. | 311 | No suitable habitat on site. | Recorded in the local area in suitable habitat during survey. Observed nesting in artificial breeding sites erected in the township and along the Clarence River.<br>No likelihood to occur on site. | Not required. |
| Animalia | Aves | Gruidae | *Grus rubicunda*<br>Brolga | Vulnerable | - | Abundant in the northern tropics, but very sparse across the southern part of its range. Often forage in dry grassland, ploughed paddocks or desert claypans but dependent on wetlands, especially shallow swamps. | 12 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Burhinidae | *Burhinus grallarius*<br>Bush Stone-curlew | Endangered | - | Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber | 7 | Marginally suitable potential habitat on site; dense weed infestations probably alienated habitat for this species. | Few records but regularly sighted in suitable open and estuary edge habitat. The closest is from the golf course to the north (2009) and the most recent is from the township (2010).<br>Low likelihood to occur. | Not required. |
| Animalia | Aves | Burhinidae | *Esacus magnirostris*<br>Beach Stone-curlew | Critically Endangered | - | Occurs on open, undisturbed beaches and estuaries | 70 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Haematopodidae | *Haematopus fuliginosus*<br>Sooty Oystercatcher | Vulnerable | - | Occurs on rocky headlands and exposed reefs, beaches and muddy estuaries | 63 | Observed in the local area during survey. No likelihood to occur on site. | None. | Not required. |
| Animalia | Aves | Haematopodidae | *Haematopus longirostris*<br>Pied Oystercatcher | Endangered | - | Favours intertidal flats of inlets and bays, open beaches and sandbanks | 197 | Observed in the local area during survey. No likelihood to occur on site. | None. | Not required. |
| Animalia | Aves | Charadriidae | *Charadrius leschenaultia*<br>Greater Sand-plover | Vulnerable | Vulnerable, Migratory | Occurs mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. | 25 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Charadriidae | *Charadrius mongolus*<br>Lesser Sand-plover | Vulnerable | Endangered, Migratory | Occurs on beaches, harbours and estuaries with large intertidal sand flats or mudflats. | 47 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Charadriidae | *Pluvialis fulva*<br>Pacific Golden Plover | - | Migratory | Widespread in non-breeding season in coastal Australasia, Melanesia and Polynesia. Usually in coastal habitats (beaches, mudflats, sandflats, mangroves, saltmarsh, seagrass), though occasionally in inland wetlands. | 45 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Charadriidae | *Pluvialis squatarola*<br>Grey Plover | - | Migratory | Occurs along coastal areas except for breeding sites which occur in tundra, often in drier areas. | 6 | No suitable habitat on site. | None. | Not required. |

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| | | | | TSC Act | EPBC Act | | | | | |
| Animalia | Aves | Scolopacidae | *Actitis hypoleucos* Common Sandpiper | - | Migratory | Found on muddy edges or rocky shores of coastal or inland wetlands, saline or fresh. Breeds in Eurasia and part of the population overwinters in Australia. | 12 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Arenaria interpres* Ruddy Turnstone | - | Migratory | Tidal reefs and pools, weed-covered rocks washed by surf, pebbly shores, mudflats, occasionally inland shallow waters, sewage farms or bare open ground near coast. Winters in southern hemisphere. | 62 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris acuminate* Sharp-tailed Sandpiper | - | Migratory | Summer migrant to Australia from the Arctic. Prefers grassy edges of shallow inland freshwater wetlands. Found also on sewage farms, flooded fields, mudflats, mangroves, beaches and rocky shores. | 43 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris alba* Sanderling | Vulnerable | Migratory | 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. | 5 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris canutus* Red Knot | - | Migratory | Breeds in the Arctic and flies non-stop to Australia. Feed in large flocks on the coast in sandy estuaries with tidal mudflats. | 33 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris ferruginea* Curlew Sandpiper | Endangered | Critically Endangered, Migratory | Breeds in Siberia and migrates to Australia in warmer months. Forages in shallow water of intertidal mudflats of sheltered coasts. Roosts on beaches, spits/islets, saltmarsh or on rocky shore. | 21 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris melanotos* Pectoral Sandpiper | - | Migratory | Prefer shallow fresh to saline wetlands. Found near the coast. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris ruficollis* Red-necked Stint | - | Migratory | Tidal mudflats, saltmarsh, sandspits, sandy or shell-grit beaches, shallow margins of salt or freshwater lakes often far inland, sewage farms. Winters in southern hemisphere. | 79 | No suitable habitat on site. | Observed in the local area during survey. No likelihood to occur on site. | Not required. |
| Animalia | Aves | Scolopacidae | *Calidris tenuirostris* Great Knot | Vulnerable | Critically Endangered, Migratory | Occurs in sheltered, coastal habitats with large, intertidal mudflats / sandflats. Often on sandy beaches with mudflats nearby, sandy spits and islets; sometimes on exposed reefs or rock platforms. Migrates to Australia from late Aug to early Sep. | 44 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Gallinago hardwickii* Latham's Snipe | - | Migratory | Non-breeding migrant to Australia in the warmer months. Found in dense cover in any vegetation around wetlands, also saltmarsh and creek edges when migrating. | 10 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Limicola falcinellus* Broad-billed Sandpiper | Vulnerable | Migratory | Favours sheltered parts of coast (estuarine sandflats, mudflats, harbours, lagoons, saltmarshes, reefs) for feeding / roosting. Occasionally seen in sewage farms or shallow freshwater lagoons. Roosts on banks on sheltered sand, shell or shingle beaches. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Limosa lapponica* Bar-tailed Godwit | - | Migratory | Tidal mudflats, estuaries, sewage farms; occasionally on shallow river-margins, brackish or salty inland lakes, flooded | 448 | No suitable habitat on site. | None. | Not required. |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| | | | | | | pastures, airfields. Needs soft sand / mud. Winters in southern hemisphere. | | | | |
| Animalia | Aves | Scolopacidae | *Limosa limosa* Black-tailed Godwit | Vulnerable | Migratory | Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats along coast. | 31 | No suitable habitat on site. | Observed in the local area during survey. No likelihood to occur on site. | Not required. |
| Animalia | Aves | Scolopacidae | *Numenius madagascariensis* Eastern Curlew | - | Critically Endangered, Migratory | Mainly coastal: sandspits, mudflats, waterways in saltmarsh, mangroves; occasionally fresh or brackish lakes, bare grassland near water. | 199 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Numenius phaeopus* Whimbrel | - | Migratory | Estuaries, channels among mangroves, tidal flats, coral cays, flat exposed reefs, flooded paddocks, occasionally sewage farms, bare grasslands, sportsgrounds, lawns. Winters in southern hemisphere. | 220 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Tringa brevipes* Grey-tailed Tattler | - | Migratory | Estuaries, wave-washed rocks and reefs, waterways in mangroves, tidal mudflats, beaches. Overwinters in southern hemisphere. | 98 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Tringa incana* Wandering Tattler | - | Migratory | Found on rocky coasts with reefs and platforms. Forages among rocks, shingles and shallow pools. | 3 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Tringa nebularia* Common Greenshank | - | Migratory | Breeds in the Palaearctic. In Australia over summer, on coast and inland, in estuaries, mudflats, mangrove swamps and lagoons. | 82 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Tringa stagnatilis* Marsh Sandpiper | - | Migratory | Summer migrant, in Australia from August to April. Commonly seen in fresh or brackish wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps. | 28 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Scolopacidae | *Xenus cinereus* Terek Sandpiper | Vulnerable | Migratory | Occurs on coastal mudflats, lagoons, creeks and estuaries | 36 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Stercorcariidae | *Stercorarius parasiticus* Arctic Jaeger | - | Migratory | Coastal offshore waters, larger bays, occasionally coastal inlets, lakes, usually in storms. Overwinters in southern hemisphere. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Anous stolidus* Common Noddy | - | Migratory | This species occurs in groups in the pelagic zone. Breeding occurs on or near islands on grass, rock or among coral rubble. | 3 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Gelochelidon nilotica* Gull-billed Tern | - | Migratory | Found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. Nest in colonies on high, dry ground on small permanent or temporary islands in a lake or marsh. | 62 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Gygis alba* White Tern | Vulnerable | - | Marine species that is a recent arrival to Lord Howe Island, only breeding there since the 1960s. | 1 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Hydroprogne caspia* Caspian Tern | - | Migratory | Large waters generally, fresh or salt lakes, larger rivers, reservoirs, estuaries, tidal mudflats, beaches, shallow coastal waters. | 45 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Onychoprion fuscata* Sooty Tern | Vulnerable | - | Terrestrial habitat confined to offshore islands. | 2 | No suitable habitat on site. | None. | Not required. |
| Animalia | Aves | Laridae | *Procelsterna cerulean* Grey Ternlet | Vulnerable | - | Terrestrial breeding habitat in oceanic islands in the South Pacific, including Lord Howe Island. | 1 | No suitable habitat on site. | None. | Not required. |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| Animalia | Aves | Laridae | *Sterna hirundo*<br>Common Tern | - | Migratory | Offshore waters, beaches, reefs, bays, tidal mudflats, lower reaches of larger rivers with sandbars, sewage farms, occasionally swamps near coast. Overwinters in southern hemisphere. | 77 | No suitable habitat on site. | Observed in the local area during survey.<br>No likelihood to occur on site. | Not required. |
| Animalia | Aves | Laridae | *Sternula albifrons*<br>Little Tern | Endangered | Migratory | Prefers sheltered coastal environments; may occur several kilometres from the sea in harbours, inlets and rivers. Nests in small colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. | 58 | No suitable habitat on site. | Observed in the local area during survey.<br>No likelihood to occur on site. | Not required. |
| Animalia | Aves | Columbidae | *Ptilinopus magnificus*<br>Wompoo Fruit-Dove | Vulnerable | - | Occurs in rainforest. | 4 | Suitable potential habitat on site. | Few records from the broader study area, the closest being 1km east of the subject site in 1979 and the most recent being 7.7km north west in Woombah in 2010.<br>However, high likelihood to occur given available habitat and mobility of species. | Further impact assessment required. |
| Animalia | Aves | Columbidae | *Ptilinopus regina*<br>Rose-crowned Fruit-Dove | Vulnerable | - | Occurs in rainforest. | 80 | Suitable potential habitat on site. | Large number of past records from the broader study area with the closest being 1km east of the subject site in 1985 and the most recent being 8km west of the subject site in 2004.<br>This species was observed nearby in Iluka NR and was heard on site. | Further impact assessment required. |
| Animalia | Aves | Cacatuidae | *Calyptorhynchus lathami*<br>Glossy Black-Cockatoo | Vulnerable | - | Breeds in large hollow-bearing trees in forest and forages on *Allocasuarina* species. | 10 | Suitable potential habitat on site. | 10 records from the broader study area with the closest and most recent being 3km east of the subject site in 2012.<br>Characteristically chewed cones were observed by Fitzgerald (2005) under an *Allocasuarina littoralis* at the northern edge of the subject site. | Further impact assessment required. |
| Animalia | Aves | Psittacidae | *Glossopsitta pusilla*<br>Little Lorikeet | Vulnerable | - | Mostly in dry open eucalypt forests and woodlands. Feeds on tree nectar and pollen, particularly profusely-flowering eucalypts, but also melaleucas and mistletoes and mistletoe fruit. Nomadic, movements probably related to food availability. | 12 | Suitable potential habitat on site. | 12 records from the broader study area with the closest being 1km east of the subject site in 1989 and the most recent being 5km south of the subject site in 2012.<br>High likelihood to occur. | Further impact assessment required. |
| Animalia | Aves | Psittacidae | *Pezoporus wallicus wallicus*<br>Eastern Ground Parrot | Vulnerable | - | Occurs in high rainfall coastal low heathlands and sedgelands, that provide very dense cover (90% or more) and below one metre in height. | 44 | No suitable habitat on site. | Low. | Not required. |
| Animalia | Aves | Strigidae | *Ninox connivens*<br>Barking Owl | Vulnerable | - | Occurs in eucalypt woodland, open forest, swamp woodlands and timbered watercourses. Occasionally uses dense vegetation for roosting. Breeds in hollows in large old trees. | 5 | Marginally suitable habitat on site. | 5 records from the broader study area with the closest being 1km south of the subject site in 1981 and the most recent being 8km north west of the subject site in 2009. | Not required. |

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| | | | | TSC Act | EPBC Act | | | | | |
| | | | | | | | | | Moderate likelihood to occur. | |
| Animalia | Aves | Strigidae | *Ninox strenua*<br>Powerful Owl | Vulnerable | - | Usually roosts in dense vegetation and hunts for arboreal mammals across large home range. | 4 | Marginally suitable habitat on site. | 4 records from the broader study area were identified with the closest being 4km north of the subject site in 1980 and the most recent being 5km west of the subject site in 2012.<br>Moderate likelihood to occur. | Not required. |
| Animalia | Aves | Tytonidae | *Tyto longimembris*<br>Eastern Grass Owl | Vulnerable | - | Occur in areas of tall grass, including swampy areas, grassy plains, swampy heath, cane grass, or sedges on floodplains. | 3 | No suitable habitat on site. | Low. | Not required. |
| Animalia | Aves | Tytonidae | *Tyto novaehollandiae*<br>Masked Owl | Vulnerable | - | Occurs in forests, but often hunts along forest edges such as roadsides. | 2 | Suitable potential foraging habitat on site. | Rarely recorded in the broader study area: only known 3km west of the subject site dating from 1998. Much more common in the hinterland forests.<br>Low likelihood to occur. | Not required. |
| Animalia | Aves | Alcedinidae | *Todiramphus chloris*<br>Collared Kingfisher | Vulnerable | - | Virtually restricted to mangrove associations of estuaries, inlets, sheltered bays and islands, and the tidal flats and littoral zone bordering mangroves. | 1 | No suitable habitat on site. | Low. | Not required. |
| Animalia | Aves | Meropidae | *Merops ornatus*<br>Rainbow Bee-eater | - | Migratory | Occurs in many habitats where there are open areas for foraging, well-placed perches to from which to forage, a water source and breeding habitat such as sandy creek banks. | 106 | Suitable potential habitat on site. | Observed foraging and nesting on site. | Further impact assessment required. |
| Animalia | Aves | Meliphagidae | *Gavicalis fasciogularis*<br>Mangrove Honeyeater | Vulnerable | - | Primary habitat in mangrove and shrublands but may also range into adjacent forests. Forages in mangroves. | 60 | No suitable habitat on site. | Low. | Not required. |
| Animalia | Aves | Pomatostomidae | *Pomatostomus temporalis temporalis*<br>Grey-crowned Babbler (eastern subspecies) | Vulnerable | - | In NSW, occurs from upper Hunter Valley to the western slopes in Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. The north coast of New South Wales is a stronghold of the Grey-crowned Babbler but they are very rare within a kilometre of the coastline but widespread and common throughout the floodplain areas of the Clarence and Richmond Valley (Greg Clancy, http://birding-aus.org/coastal-n-nsw-and-grey-crowned-babblers/). | 38 | Marginally suitable potential habitat on site. | Closest records from Iluka NR from 1979 and 1981.<br>Most recent records are from Yamba in 2009.<br>Due to rarity near the coast and poor habitat on site, considered low likelihood to occur. | Not required. |
| Animalia | Aves | Neosittidae | *Daphoenositta chrysoptera*<br>Varied Sittella | Vulnerable | - | Found in eucalypt woodlands and forests, preferring rough-barked trees or mature trees with hollows or dead branches. | 8 | Suitable habitat on site. | Observed foraging on site. | Further impact assessment required. |
| Animalia | Aves | Campephagidae | *Coracina lineata*<br>Barred Cuckoo-shrike | Vulnerable | - | Occurs in rainforest and large tracts of eucalypt forest. | 11 | Suitable potential habitat on site. | Of the records from the broader study area, the closest is 1km south east of the subject site from 1979 and prior to survey for this project, the most recent was 2km north of the subject site in 1992.<br>This species was observed 500 m to the east in Iluka NR at the time of survey.<br>High likelihood to occur. | Further impact assessment required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| Animalia | Aves | Artamidae | *Artamus cyanopterus cyanopterus* Dusky Woodswallow | Vulnerable | - | A woodland dependent bird, known from woodlands and dry open sclerophyll forests, usually dominated by eucalypts; very occasionally in moist forests or rainforests. Often seen on roadsides and on golf courses. Understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. Partially migratory. | 11 | Marginally suitable habitat on site. | Almost all local records more than 30 years old. Low likelihood to occur. | Not required. |
| Animalia | Aves | Monarchidae | *Carterornis leucotis* White-eared Monarch | Vulnerable | - | Occurs in rainforest, especially littoral rainforest and swamp forest. Prefers the ecotone between open vegetation and rainforest. | 50 | Suitable potential habitat on site. | 50 records from the broader study with the closest being less than 1km east of the subject site in 1993 and the most recent being 3km north of the subject site in 2013. High likelihood to occur. | Further impact assessment required. |
| Animalia | Mammalia | Dasyuridae | *Dasyurus maculatus* Spotted-tailed Quoll | Vulnerable | Endangered | Occurs in a number of forest habitats but requires large areas of relatively intact forest. | 16 | Marginally suitable potential habitat on site. | 16 records from the broader study area with the closest and most recent being 1km south of the subject site in 2004. However, most records date from the 1970s and 1990s and have been generated by a community survey that often generates records of uncertain dates. It is likely that the local population of this species persists only in very low numbers, if at all. Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Dasyuridae | *Phascogale tapoatafa* Brush-tailed Phascogale | Vulnerable | - | Prefers dry sclerophyll open forest with sparse ground cover. | 16 | Marginally suitable potential habitat on site. | 16 records from the broader study area with the closest being within 1km of the subject site in 1991 and the most recent being 9km west of the subject site in 2002. Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Dasyuridae | *Planigale maculate* Common Planigale | Vulnerable | - | Occurs in a range of forest, heath and marshland where there is surface cover and usually close to water. | 5 | No suitable habitat on site. | Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Phascolarctidae | *Phascolarctos cinereus* Koala | Vulnerable | Vulnerable | Inhabits eucalypt woodlands and forests. | 320 | Suitable habitat on site. | A large number of records from the broader study area (>315) as the Iluka population has been well studied. Thought to be (at least functionally) extinct. The most recent record was 5km north west of the subject site in 2013. This species was photographed on site by camera trap during survey. | Further impact assessment required. |
| Animalia | Mammalia | Petauridae | *Petaurus australis* Yellow-bellied Glider | Vulnerable | - | Favours tall mature eucalypt forest in areas with high rainfall and nutrient rich soils. | 4 | No suitable habitat on site. | Low to no likelihood to occur. | Not required. |
| Animalia | Mammalia | Petauridae | *Petaurus norfolkensis* Squirrel Glider | Vulnerable | - | Inhabits Blackbutt- Bloodwood forests with heath understorey in coastal areas. | 27 | Marginally suitable potential habitat on site. Poor foraging habitat, some potential denning sites. | Of the 27 records within the broader study area, the closest is less than 1km south west of the subject site in 2010 and the most recent is 4km south west of the subject site in 2014 on the other side of the Clarence River. | Not required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| | | | | | | | | | Low to moderate likelihood to occur. | |
| Animalia | Mammalia | Pseudocheiridae | *Petauroides volans*<br>Greater Glider | - | Vulnerable | Largely restricted to eucalypt forests and woodlands and typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat and favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. | 8 | Marginally suitable potential habitat on site. Poor foraging habitat, some denning sites. | Local records are all from north of Woombah; none from the Iluka Peninsula. | Not required. |
| Animalia | Mammalia | Potoroidae | *Aepyprymnus rufescens*<br>Rufous Bettong | Vulnerable | - | Inhabits a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. | 1 | Inhabits a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. | Only 1 record within the broader study area being 5km west of the subject site (on the other side of the Highway and the river), dating from 2012. No records east of the highway and none on or near the Iluka peninsula.<br>Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Pteropodidae | *Pteropus poliocephalus*<br>Grey-headed Flying-fox | Vulnerable | Vulnerable | Foraging habitat in flowering eucalypts, particularly winter-flowering species; camps in dense wet forest or rainforest gullies. | 74 | Foraging habitat in flowering eucalypts, particularly winter-flowering species; camps in dense wet forest or rainforest gullies. | Suitable potential foraging habitat on site. | Further impact assessment required. |
| Animalia | Mammalia | Pteropodidae | *Syconycteris australis*<br>Common Blossom-bat | Vulnerable | - | Roosts in littoral rainforest and feeds on flowers (particularly Banksia) in adjacent heathland and paperbark swamps. | 21 | Suitable potential habitat on site. | 21 records within the broader study area with the closest being 1km to the east in 1990 and the most recent being 6km to the south in 2006.<br>A breeding population of this species occurs adjacent to the subject site in Iluka NR.<br>High likelihood to occur. | Further impact assessment required. |
| Animalia | Mammalia | Molossidae | *Mormopterus norfolkensis*<br>Eastern Freetail-bat | Vulnerable | - | Occur in dry sclerophyll forest and woodland, roost in hollows and man-made structures. | 2 | Suitable potential habitat on site. | 2 records from within the broader study area with the closest and most recent being 3km west of the subject site in 2002.<br>This species was recorded foraging on site during survey. | Further impact assessment required. |
| Animalia | Mammalia | Vespertilionidae | *Chalinolobus nigrogriseus*<br>Hoary Wattled Bat | Vulnerable | - | Roosts in tree hollows and forages in open understorey of dry open eucalypt forests dominated by Spotted Gum, Boxes and Ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Flies fast below the canopy. | 9 | No potential habitat on site. | Low. | Not required. |
| Animalia | Mammalia | Vespertilionidae | *Miniopterus australis*<br>Little Bentwing-bat | Vulnerable | - | Roosts in caves and forages beneath tree canopies. | 37 | Suitable potential foraging habitat on site. | 35 records from the broader study area with the closest being 1km east of the subject site in 1984 and the most recent being 10km south at Angourie in 2013. | Further impact assessment required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| | | | | | | | | | This species was recorded foraging on site during survey. | |
| Animalia | Mammalia | Vespertilionidae | *Miniopterus schreibersii oceanensis*<br>Eastern Bentwing-bat | Vulnerable | - | Roosts in caves and forages above tree canopies. | 2 | Suitable potential habitat on site. | Only 2 records from the broader study area in 1998 and 2001.<br>Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Vespertilionidae | *Myotis macropus*<br>Southern Myotis | Vulnerable | - | Forages over large bodies of water and roosts in hollows or under old wooden bridges, sometimes up to 10 km from foraging habitat. | 25 | Suitable potential roosting habitat on site in the hollow-bearing trees. | 25 records from the broader study area with the closest being 5km south west of the subject site in 2003 and the most recent being 10km west of the subject site in 2015. No records of this species from the Iluka peninsula and all known roosting sites beneath bridges over the Clarence River and its tributaries.<br>Low likelihood to occur. | Not required. |
| Animalia | Mammalia | Vespertilionidae | *Nyctophilus bifax*<br>Eastern Long-eared Bat | Vulnerable | - | Occurs in lowland subtropical rainforest and wet and swamp eucalypt forest. Roosts in tree hollows, among epiphytes and dense clumps of rainforest foliage. | 76 | Marginally suitable foraging and roosting potential habitat on site. | 76 records within the broader study area with the closest being 1km to the east in 1994 and the most recent being 2km to the south in 2008.<br>A large number of records are from Iluka NR.<br>Possibly recorded foraging on the site during survey.<br>High likelihood to occur. | Further impact assessment required. |
| Animalia | Mammalia | Vespertilionidae | *Scoteanax rueppellii*<br>Greater Broad-nosed Bat | Vulnerable | - | Found in a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though most commonly found in tall wet forest. Roosts in tree hollows and forages over creeks and other corridors in forest. | 6 | Marginally suitable potential habitat on site; probably too cluttered with Lantana. | Only 6 records from the broader study area with closest and most recent being 2km south of the subject site in 2008.<br>Low to moderate likelihood to occur. | Not required. |
| Plantae | Flora | Anthericaceae | *Caesia parviflora var. minor*<br>Small Pale Grass-lily | Endangered | - | Found in damp places in open forest on sandstone. | 1 | No suitable habitat on site. | Low to none | Not required. |
| Plantae | Flora | Casuarinaceae | *Allocasuarina defungens*<br>Dwarf Heath Casuarina | Endangered | Endangered | Occurs on coastal heath. | 1 | No suitable habitat on site. | Low | Not required. |
| Plantae | Flora | Cyperaceae | *Cyperus aquatilis*<br>Water Nutgrass | Endangered | - | Occurs in ephemeral wet sites such as roadside ditches and seepage area in sandstone areas. | 1 | No suitable habitat on site. | Low to none | Not required. |
| Plantae | Flora | Dilleniaceae | *Hibbertia marginata*<br>Bordered Guinea Flower | Vulnerable | Vulnerable | Occurs in grassy or shrubby open eucalypt forest at low altitudes on sandstone. | 1 | No suitable habitat on site. | Low to none | Not required. |
| Plantae | Flora | Euphorbiaceae | *Chamaesyce psammogeton*<br>Sand Spurge | Endangered | - | Occurs on coastal sand dunes. | 7 | No suitable habitat on site. | Low to none | Not required. |
| Plantae | Flora | Fabaceae (Faboideae) | *Sophora tomentose*<br>Silverbush | Endangered | - | Occurs on coastal sand dunes. | 4 | No suitable habitat on site. | Low | Not required. |
| Plantae | Flora | Juncaginaceae | *Maundia triglochinoides* | Vulnerable | - | Occurs in freshwater wetlands. | 2 | No suitable habitat on site. | Low to none | Not required. |
| Plantae | Flora | Lauraceae | *Endiandra hayesii*<br>Rusty Rose Walnut | Vulnerable | Vulnerable | It is a rainforest species occurring in cool, moist sheltered valleys and gullies. | 1 | No suitable habitat on site. | Low | Not required. |
| Plantae | Flora | Menispermaceae | *Tinospora tinosporoides*<br>Arrow-head Vine | Vulnerable | - | Common in subtropical rainforests, littoral rainforests on fertile, basalt soils. | 2 | No suitable habitat on site. | Low | Not required. |

| Kingdom | Class | Family | Species | Status | | Habitat requirements | Number of records | Potential habitat on site | Likelihood to occur | Further consideration |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSC Act | EPBC Act | | | | | |
| Plantae | Flora | Orchidaceae | *Diuris* sp. aff. *chrysantha* Byron Bay Diuris | Endangered | - | Known only from a single location at Byron Bay. Occurs in low-growing grassy heath on clay soil. | 1 | No suitable habitat on site. | Low | Not required. |
| Plantae | Flora | Orchidaceae | *Peristeranthus hillii* Brown Fairy-chain Orchid | Vulnerable | - | Restricted to coastal areas including littoral rainforest and lowland rainforest on floodplain. | 1 | No suitable habitat on site. | Low | Not required. |
| Plantae | Flora | Orchidaceae | *Phaius australis* Southern Swamp Orchid | Endangered | Endangered | Occurs in swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas; as far south as Coffs Harbour. | 21 | Suitable habitat on site. | This species was found north of the site next to the golf course. Potential habitat for this species occurs at the western end of the site in swamp sclerophyll forest. High likelihood to occur. | Further impact assessment required. |
| Plantae | Flora | Rutaceae | *Acronychia littoralis* Scented Acronychia | Endangered | Endangered | Found in transition zones between littoral rainforest and swamp sclerophyll forest. Usually occurs within 2km from the coast on sandy soils. | 17 | Suitable habitat on site. | 16 records were identified with the closest and most recent being 3km south of the subject site in 2012. High likelihood to occur. | Further impact assessment required. |

**Table 1.2:** Flora species recorded in quadrats during all field survey. Abundance ratings are a modified 7 point Braun-Blanquet scale. Quadrat locations are shown in the text. RM = Random Meander, MF = reported by Mark Fitzgerald during previous survey. N = Nearby, * = exotic

| Family | Scientific Name | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | A | B | C | D | E | F | G | H | K | L | M | N | RM | MF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acanthaceae | *Thunbergia alata** | | N | | | | | | | | | | | | | | | | | | | |
| Amaranthaceae | *Deeringia amaranthoides* | 2 | | | | | | | | | | | | | | | | | | | | |
| Anacardiaceae | *Euroschinus falcatus var. falcatus* | | | | | | | | | | | | | | | | | | | | | x |
| Apocynaceae | *Parsonsia straminea* | 2 | 2 | | | | 1 | | | | | | 1 | | | 1 | | | | | | |
| Araliaceae | *Polyscias elegans* | 2 | 2 | | 2 | | | 4b | 1 | | 1 | | 2 | | | | 1 | | 2 | 2 | | |
| Araliaceae | *Schefflera actinophylla** | 2 | 4b | | 2 | | | N | | | | | | | | | | | | | | |
| Arecaceae | *Archontophoenix cunninghamiana* | 1 | 3 | | | | | | | | | | | | | | | | | | | |
| Arecaceae | *Livistona australis* | 2 | 1 | | | | | | | | | | N | | | | | | | | | |
| Arecaceae | *Syagrus romanzoffiana** | | N | | | | | | | | | | | | | | | | | | | |
| Asparagaceae | *Asparagus aethiopicus** | 4b | 4b | 3 | | 1 | 1 | N | 1 | 2 | | 2 | 3 | | 2 | 4b | 4b | 3 | 3 | 2 | | |
| Asparagaceae | *Asparagus densiflorus** | 4b | 4b | | | | | | | | | | | | | | | | | | | |
| Aspleniaceae | *Asplenium australasicum* | N | 1 | | | | | N | | | | | | | | | | | | 2 | | |
| Asteliaceae | *Cordyline stricta* | | 1 | | | | | | | | | | | | | | | | | 1 | | |
| Asteraceae | *Conyza sp.** | | | | | 1 | | | | | | | | | | | | | | | | |
| Asteraceae | *Delairea odorata** | | | | | N | | | 1 | | | | | | | | | | | | | |
| Asteraceae | *Senecio amygdalifolius* | | | | | | | | | | | | | | 1 | | | | | | | |
| Bignoniaceae | *Pandorea pandorana* | N | 2 | | | | 1 | | | | | | | | | | | | | | | |
| Blechnaceae | *Blechnum cartilagineum* | | | | | | | | 1 | | | | | | | | | | | | | |
| Casuarinaceae | *Allocasuarina littoralis* | | | N | | | | N | | | | | | | | | | | | | | |
| Commelinaceae | *Commelina cyanea* | 1 | 2 | 1 | 1 | 1 | | | | | | 1 | 2 | 2 | | | | | | 1 | | |
| Commelinaceae | *Tradescantia fluminensis** | | 4b | | | | | | 6 | | | | | | | | 3 | | | | | |
| Commelinaceae | *Tradescantia zebrina** | | | | | N | | | | | | | | | | | | 4a | | | | |
| Convolvulaceae | *Ipomoea cairica** | | | | | | | | | | | | | | | | | | | | x | |
| Crassulaceae | *Bryophyllum delagoense** | | | N | | | | | | | | | | | | | | | | | | |
| Cupressaceae | *Callitris columellaris* | | | | | 4b | | | 1 | 1 | | 1 | | | 1 | 5 | | 4b | | 4b | | |

| Family | Scientific Name | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | A | B | C | D | E | F | G | H | K | L | M | N | RM | MF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyperaceae | *Cyperus stradbrokensis* | | | 1 | 2 | 2 | | | 1 | 1 | 3 | | 2 | 2 | 3 | 1 | 3 | 3 | | 3 | | |
| Cyperaceae | *Cyperus tetraphyllus* | 2 | 2 | | | | | | | | | | | | | | | | | | | |
| Davalliaceae | *Nephrolepis cordifolia* | | | | | | | | | | | | | | | | | | | | x | |
| Dennstaedtiaceae | *Pteridium esculentum* | 3 | 3 | 4b | 3 | 2 | 1 | 1 | | 3 | 1 | | | 2 | 2 | 2 | 3 | 1 | 1 | | | |
| Dilleniaceae | *Hibbertia scandens* | | | N | 1 | | 1 | | | | | | | | | | 1 | | | | | |
| Dioscoreaceae | *Dioscorea transversa* | 2 | | | | | | | | | | | | | | | | | 1 | | | |
| Elaeocarpaceae | *Elaeocarpus obovatus* | | | | | | | N | | | | | | | | | | | | | | |
| Ericaceae | *Leucopogon leptospermoides* | | | | | | | | | 1 | | | | | | | | | | | | |
| Ericaceae | *Monotoca elliptica* | 2 | | | | N | | | | | | | | | 2 | | | | | | | |
| Ericaceae | *Trochocarpa laurina* | 4b | 2 | 1 | 1 | 1 | | | 1 | | | | | | | 1 | | | | 2 | | |
| Euphorbiaceae | *Breynia oblongifolia* | 2 | | 1 | 1 | 1 | 1 | | 1 | | | | 1 | 1 | | 1 | 1 | | | 1 | | |
| Euphorbiaceae | *Claoxylon australe* | | | | | | 1 | | | | | | | | | | | | | | | |
| Euphorbiaceae | *Glochidion ferdinandi var. ferdinandi* | N | | | | | 4b | | | | | | | | | | | | | | | |
| Fabaceae | *Senna pendula var. glabrata** | 1 | N | | | | | | | | | | | | | 1 | | | | | | |
| Lamiaceae | *Clerodendrum tomentosum* | | | | | | | | | | | | | | | | | 1 | | | | x |
| Lamiaceae | *Gmelina leichhardtii* | | | | | | | | | | | | | | | | | | | | | x |
| Lauraceae | *Beilschmiedia obtusifolia* | | 1 | | | | | | | | | | | | | | | | | | | |
| Lauraceae | *Cinnamomum camphorum** | | | | | | | | | | | | | | | | | | | | | x |
| Lauraceae | *Cryptocarya glaucescens* | 2 | | | | | | | | | | | | | | | | | | | | |
| Lauraceae | *Endiandra discolor* | | 1 | | | | | | | | | | | | | | | | | | | |
| Lauraceae | *Endiandra sieberi* | 1 | 1 | | | | | | | | | | | | 1 | | | | | | | |
| Lauraceae | *Neolitsea australiensis* | | 1 | | | | | | | | | | | | | | | | | | | |
| Lomandraceae | *Lomandra filiformis var. filiformis* | | | | | 1 | | | | | | | | | | | | | | | | |
| Lomandraceae | *Lomandra longifolia* | 3 | 3 | 1 | | 3 | 1 | N | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 2 | 2 | 1 | 2 | | |
| Luzuriagaceae | *Eustrephus latifolius* | 2 | 2 | | | | 1 | | | | | | | | | | | | | | | |
| Luzuriagaceae | *Geitonoplesium cymosum* | | 1 | | | | 1 | | | | | | 1 | | | | 1 | | 1 | 2 | | |
| Malvaceae | *Commersonia bartramia* | | 1 | | | | | | | | | | | | | | | | | | | |
| Malvaceae | *Sterculia quadrifida* | | | | | | | | | | | | | | | | | | | | x | |

| Family | Scientific Name | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | A | B | C | D | E | F | G | H | K | L | M | N | RM | MF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Meliaceae | *Synoum glandulosum* | | | | | | | | | | | 1 | 1 | | | | | | | | | |
| Menispermiaceae | *Stephania japonica var. discolor* | 3 | 3 | 1 | | | 1 | | | | | | nby | | | | | | | | | |
| Mimosaceae | *Acacia disparrima subsp. disparrima* | | 2 | 5 | 4b | 4b | 4b | 4b | 5 | 5 | 6 | 6 | 4b | 5 | 5 | 4b | | 4b | | 4b | | |
| Mimosaceae | *Acacia maidenii* | 4b | 4b | | N | | | | | | | | | | | | | | 2 | | | |
| Monimiaceae | *Wilkiea huegeliana* | N | 1 | | | | | | | | | | | | | | | | | | | |
| Moraceae | *Ficus elastica** | | N | | | | | | | | | | | | | | | | | | | |
| Moraceae | *Maclura cochinchinensis* | 2 | N | | | | | | | | | | | | | | | | | | | |
| Myrsinaceae | *Myrsine variabilis* | | | | | | | | | | | | | | | | | | | | | x |
| Myrtaceae | *Acmena hemilampra* | N | | | | | 4b | N | | | | | | | | | | | | | | |
| Myrtaceae | *Austromyrtus dulcis* | | | | | | | | | | | | | | | | | | | | x | |
| Myrtaceae | *Corymbia intermedia* | 5 | 4b | | 4b | | 4b | 1 | 1 | | | | 3 | | | | | | 3 | | | |
| Myrtaceae | *Eucalyptus propinqua var. propinqua* | | | | | | | N | | | | | | | | | | | | | | |
| Myrtaceae | *Eucalyptus tereticornis* | | | | | | 4b | | | | | | nby | | | | | | | | | |
| Myrtaceae | *Leptospermum laevigatum* | | | | | | | N | | | | | | | | | 1 | | | | | |
| Myrtaceae | *Leptospermum polygalifolium subsp. polygalifolium* | | | 1 | | | | | | | | | | | | | | | | | | |
| Myrtaceae | *Lophostemon confertus* | 4b | 4b | | 1 | N | | N | | | | | 4b | | | | | | 4b | | | |
| Myrtaceae | *Melaleuca quinquenervia* | 1 | 4b | | | | | | | | | | | | | | | | 4b | | | |
| Myrtaceae | *Pilidiostigma glabrum* | | | | | | | | | | | | | | | | | | | | | x |
| Myrtaceae | *Psidium cattleyanum var. cattleyanum** | | | | | | | | | | | | | | | | | | | | | x |
| Myrtaceae | *Syzygium australe* | | | 1 | | | | | | | | | | | | | | | | | | |
| Myrtaceae | *Syzygium luehmannii* | | 4b | | | | | | | | | | | | | | | | | | | |
| Ochnaceae | *Ochna serrulata** | 3 | 4b | | | | 1 | | | | | | | | | | | | | | | |
| Oleaceae | *Notelaea longifolia forma intermedia* | 1 | 1 | | | | | | | | | | | | | | | | 1 | | | |
| Orchidaceae | *Corybas sp* | | | | | | | | | | | | | | | | | | 1 | 2 | | |
| Orchidaceae | *Cymbidium madidum* | | | | | 1 | | | | | | | | | | | | | | | | |
| Orchidaceae | *Cymbidium suave* | N | | | | | | | | | | | | | | | | | | | | |
| Orchidaceae | *Pterostylis nutans* | | | | | | | | | | | | | | | | | | 1 | 3 | | |

| Family | Scientific Name | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | A | B | C | D | E | F | G | H | K | L | M | N | RM | MF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Orchidaceae | *Zeuxine oblonga* | 1 | | | 1 | | 1 | | | | | | | | | | | | | | | |
| Passifloraceae | *Passiflora herbertiana* | 3 | N | | | | 1 | | | | | | | 2 | | | | | | | | |
| Phormiaceae | *Dianella caerulea* | 2 | 2 | | | N | | | | | | | | | | | | | | | | |
| Phyllanthaceae | *Bridelia exaltata* | | | | | | | | | | | | | | | | | | | | | x |
| Pinaceae | *Pinus sp.** | | N | | | | | | | | | | | | | | | | | | | |
| Poaceae | *Cynodon dactylon* | | | | | | | | | | | | | | | | | | | | | |
| Poaceae | *Entolasia stricta* | | 2 | | | | | | | | | | | | | | | | | | | |
| Poaceae | *Megathyrsus maximus** | 4a | 4b | 7 | 4b | 4b | 4b | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 5 | 3 | 5 | 5 | | 5 | | |
| Poaceae | *Oplismenus aemulus* | | | 1 | | | | | | | | | | | | | | | | | | |
| Poaceae | *Paspalum urvillei** | | N | | | | | | | | | | | | | | | | | | | |
| Polypodiaceae | *Platycerium bifurcatum* | 3 | | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | | 3 | | |
| Proteaceae | *Banksia integrifolia subsp. integrifolia* | 2 | 2 | 1 | 4b | 1 | | 1 | 1 | 1 | 1 | 1 | 3 | | | | 4b | 1 | | | | |
| Proteaceae | *Banksia serrata* | | 1 | | | | | | | | | | | | | | | | | | | |
| Proteaceae | *Persoonia stradbrokensis* | | | | | N | | | 1 | | | | | | 2 | | | | | | | |
| Pteridaceae | *Pellaea falcata* | | | | | | | | 1 | | | | | | | | | | | | | |
| Rhamnaceae | *Alphitonia excelsa* | | | | | | | | | | | | | | 1 | | | 1 | | | | |
| Rhamnaceae | *Pomaderris vellea* | 1 | | | | | | | | | | | | | | | | | | | | |
| Rosaceae | *Rubus rosifolius* | | | | N | | | | | | | | | | | | | | | | | |
| Rubiaceae | *Caelospermum paniculatum* | | 1 | | | | | | | | | | | | | | | | | | | |
| Rubiaceae | *Coffea arabica** | | N | | | | | | | | | | | | | | | | | | | |
| Rubiaceae | *Morinda jasminoides* | 2 | | | 1 | | | | | | | | | | | | | | 2 | | | |
| Rubiaceae | *Pomax umbellata* | N | 1 | | | | | | | | | | | | | | | | | | | |
| Rutaceae | *Acronychia imperforata* | 4b | 3 | 1 | 2 | 2 | 4b | 4b | 1 | 2 | 1 | 1 | 2 | | 2 | 3 | 4b | 2 | 2 | | | |
| Rutaceae | *Acronychia oblongifolia* | | | | | | | | | | | | | | | | | | | 2 | | x |
| Rutaceae | *Melicope micrococca* | | | | | | | | | | | | | nby | | | | 1 | 3 | | | |
| Sapindaceae | *Cupaniopsis anacardioides* | 4b | | | | | 3 | | | | | | 3 | | 2 | 3 | 3 | 1 | 2 | | | |
| Sapindaceae | *Mischocarpus pyriformis* | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | | | | 1 | 1 | 2 | | | |
| Smilacaceae | *Smilax australis* | 3 | 3 | 2 | 1 | | 1 | 1 | 1 | | | 1 | 1 | | | 1 | 1 | 1 | 2 | 1 | | |

| Family | Scientific Name | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | A | B | C | D | E | F | G | H | K | L | M | N | RM | MF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solanaceae | *Solanum nigrum** | 2 | | 1 | | | | | | | | | | | | | 1 | | | | | |
| Solanaceae | *Solanum seaforthianum** | 2 | | | | | 1 | | | | | | | | | | 1 | | | | | |
| Verbenaceae | *Lantana camara** | 6 | 6 | 5 | 6 | 4b | 4b | 7 | | | 6 | 5 | 4b | 5 | 3 | 4b | 5 | 4b | | 4b | | |
| Vitaceae | *Cayratia clematidea* | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| Vitaceae | *Cissus hypoglauca* | | 2 | | 1 | | | 4b | | | | | | | | | | | 2 | | | |
| Vitaceae | *Cissus sterculiifolia* | N | | | | | | | | | | | | | | | | | | | | |

**APPENDIX 3**

**SECTION 5A ASSESSMENTS**
**"SEVEN PART TESTS"**

**Coastal Cypress Pine Forest**

Coastal Cypress Pine Forest in the NSW North Coast Bioregion is listed as an endangered ecological community under the NSW Threatened Species Conservation Act (1995). It is not listed under the schedules of the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999).

Coastal Cypress Pine Forest is restricted to the NSW North Coast Bioregion. It is found typically on coastal sand plains, north of Angourie (EOH 2016).

It is dominated by *Callitris columellaris* Coastal Cypress Pine but may sometimes have a mixed canopy with Myrtaceae (*Corymbia intermedia* Pink Bloodwood, *Eucalyptus pilularis* Blackbutt, *Eucalyptus signata* Scribbly Gum), wattles (*Acacia disparrima* Salwood), she-oaks (*Allocasuarina littoralis* Black She-oak) or Banksias (*Banksia integrifolia, Banksia serrata*) or rainforest trees.

The Final Determination (NSW Scientific Committee 2011) defines this community as having and open to sparse understorey of shrubs, sedges and herbs. The community may have a distinctive litter layer with patches of compressed Coastal Cypress Pine branchlets (OEH 2016a). Structural forms of the community include woodland, open forest and closed forest, although the tree stratum may be very sparse, absent, or comprised only of dead trees in stands affected by partial clearing, tree senescence or fire (NSW Scientific Committee 2011).

Fires may influence the structure and floristic diversity of the community, as the dominant tree species, Coastal Cypress Pine, is generally killed when burnt (OEH 2016a). Besides the trees listed above, the characteristic assemblage of species within the Final Determination includes many shrubs, grasses, and soft ground covers.

The species present and their relative abundance will vary as a function of environmental factors such as rainfall, drought conditions and disturbances including fire regimes. The above ground relative abundance of species can change depending on the time since fire and may also change in response to changes in the fire regime (NSW Scientific Committee 2008).

Recent analysis of vegetation across the Northern Rivers Catchment Management Area by OEH (2012) has recognised three vegetation types that comprise this community: Community number 186 Coast Cypress Pine – Salwood – Jam Tarts shrubby open forest; Community number 187 Coast Cypress Pine shrubby open forest; and Community number 188 Coast Cypress Pine open forest to closed forest with littoral rainforest elements.

The total area of occurrence is thought to be highly restricted, with estimates of 150 hectares to 200 hectares (Benwell 1995). It is currently known from approximately 15 to 20 locations with majority of known patches being smaller than 10 hectares (NSW Scientific Committee 2008) and half of all occurrences are mapped within National Parks including Bundjalung National Park, Yuraygir National Park, Broadwater National Park, and Billinudgel Nature Reserve (NSW Scientific Committee 2011).

This community has undergone significant decline since European settlement with estimates suggesting that the area occupied by this EEC may have declined by more than 77% (Benwell 1998, in NSW Scientific Committee 2011). Clearing remains a threat to this community with coastal development and sand mining imposing the greatest impacts. Other threats include habitat degradation and weed invasion from a number of noxious species including *Asparagus aethiopicus* and *Lantana camara* Lantana (NSW Scientific Committee 2008).

The subject site contains scattered occurrences of species characteristic of this community, including *Callitris columellaris* Coastal Cypress Pine and *Cyperus stradbrokensis*, but the EEC is considered to be restricted to a patch of 0.25 hectares along the southern boundary. Ii also occurs on the adjacent crown land in two patches of 1.15 and 1.16 hectres.

It is proposed to retain the 0.25 hectare patch in its entirety and conservaton manage it in Park C. Approximately 70 squre metres of this EEC will need to eb cleared fro rationalisation of the fire trail at its eastern end.

***(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,***

**Response:**

This question is not relevant to an endangered ecological community.

***(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,***

**Response:**

This question is not relevant to an endangered ecological community.

***(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***

**Response:**

The proposed works will remove a small area of 70 square metres and retain and mange for conservation 0.25 hectares. Its local occurrence will be retained almost in t=its entirety.

***(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,***

**Response:**

The removal of weed-infesed disturbed bushland will remove weed propagules from the local environment. The area of this EEC on site will be retained and managed under an approved conservation management plan. This is not likely to modify the composition of the community such that its local occurrence will be placed at risk of extinction.

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

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

**Response:**

The proposed works will remove 70 square metres of this endangered ecological community at the edge of the fire trail. The remaining area of occurrence will be retained nad proected.

***(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***

**Response:**

The bushland of the coastal sands of Iluka Peninsula are relatively well connected. While the proposal will remove a portion of bushland, there will remain north to south and east to west linkages. The removal of highly modified and weedy bushland is unlikely to significantly exacerbate this pattern.

***(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,***

**Response:**

The area of habitat to be removed or modified totals 70 square metres. This is unlikely to represent habitat important enough to threaten its long term survival.

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

**Response:**

No critical habitat has been declared for this endangered ecological community.

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

**Response:**

No recovery plan has been published for this community however, the Office of Environment and Heritage is currently developing management strategies for this endangered ecological community. The following management strategy has been identified for this community (OEH 2016b):

1. The extent and condition of this ecological community will be improved or maintained primarily via positive management consistent with Catchment Action Plans, water management plans, and by regulating clearing. Where it occurs on private lands, this ecological community will also benefit from voluntary agreements with landholders to manage the land for conservation purposes.

A number of recovery activities have also been identified (OEH 2016a):

2. Avoid edge encroachment and trampling, using defined walking tracks and fencing where appropriate.
3. Undertake weed management in remnants.
4. Generally, avoid fire in this community but arrange ecological burning where assessed by OEH as necessary for regeneration.
5. Expand and connect isolated remnants by planting and/or bush regeneration.

The proposed development retains the extent of this community on site within bushland reserve as part of the design and a site-specific management plan is recommended. Therefore, the proposal is largely consistent within these outcomes.

***(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.***

**Response:**

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation", but only within a very small area occupied by this endangered ecological community.

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### *Acronychia littoralis* Scented Acronychia

*Achronychia littoralis* is listed as Endangered under Schedule 2 of the Threatened Species Conservation Act (1995). This species is also listed as Endangered under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

This species is a small tree growing to 6 metres tall with four-petalled yellowish flowers produced in summer growing from the leaf and stem junction (OEH 2015a). Fruits that are produced during summer have a flattened oval shape and are a creamy lemon colour up to 20 millimetres in diameter, with four lobes separated by shallow fissures (Commonwealth Conservation Advice 2008).

It occurs within 2 kilometres of the coast from Port Macquarie in the south to Fraser Island in the north, on sand in humid areas with rainfall greater than 1,600 millimetres (Commonwealth Conservation Advice 2008). This species is found in transition zones between littoral rainforest and swamp sclerophyll forest; littoral and coastal cypress pine communities and margins of littoral forest (Department of the Environment 2015). Over 40% of the known populations are in national parks and nature reserves (Department of the Environment 2015), including the nearby Bundjalung National Park. The population within the park near the Esk River is a proposed key site for the conservation of this species (OEH 2015b).

There are two forms of this species, with one producing viable seeds and one that reproduces vegetatively (OEH 2015a). All known populations of this species occur in fragmented habitats susceptible to disturbance and are facing threats from development, weeds (particularly *Lantana camara* Lantana), salt-laden wind burn and fires (NSW Department of the Environment 2015).

This species was not recorded on the subject site despite intensive survey. Potential habitat for this species occurs across the site, albeit in highly modified bushland.

***(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,***

**Response:**

Little is known about the life cycle triggers for this species. It is very difficult to propagate from seed and it is mooted that it may need to pass through the gut of a bird to trigger germination (Erskine 2013). This species is also known to sucker, which may be a survival mechanism after fire. The closely related *Acronychia imperforata* is known to resprout after fire (NSW NPWS 2002).

The known (presumably viable) local population occurs further north at the Esk River in Bundjalung National Park and a new record in Iluka NR was established during this study.

The proposed development will remove most of the poor quality marginal habitat on site

while retaining the intact remnant vegetation and rehabilitating some of the other vegetation in Parks A and B.

The proposal is not considered likely to significantly alter either of the factors identified as having a likely impact on the life cycle of this species - fire and frugivores.

***(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,***

**Response:**

This question is not relevant to a threatened species.

***(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***

**Response:**

This question is not relevant to a threatened species.

***(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,***

**Response:**

This question is not relevant to a threatened species.

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

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

**Response:**

Poor quality marginal potential habitat occurs on site in the 16.4 hectares to be cleared.

***(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***

**Response:**

The pattern of fragmentation of habitat will be marginally altered. Connectivity of habitat within the site and with adjacent areas of bushland will be maintained by the retention and conservation management of Parks A and B. The regional wildlife corridor is located outside of the subject site and will not be impacted by the proposal. It is therefore considered that the degree of increased fragmentation is not significant, particularly considering that the site provides only potential habitat in a highly modified state.

***(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,***

**Response:**

The habitat on site cannot be considered to be important for the long term survival of a local viable population as it provides potential habitat only and of highly modified, poor quality bushland. Known local population occurrences are to the north near the Esk River in Bundjalung National Park and in Iluka Nature Reserve to the east, distant from the subject site.

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

**Response:**

No critical habitat has been declared for this species.

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

**Response:**

This species has been assigned to the "site managed species" management stream under the NSW Office of Environment and Heritage (OEH 2015b), as it is considered that this species can be successfully secured by carrying out targeted conservation projects on specific sites. Eight such sites have been identified for this species, none of which include the subject site (OEH 2015b).

The nearest management site is the Esk River site, and its management and the objectives of the management actions to be undertaken in this population are:

1. Reduce and maintain weed densities at low levels (particularly Bitou Bush);
2. Exclude fire;
3. Minimise accidental damage on road / track edges;
4. Determine the area of occupancy; and
5. Track species abundance and condition over time.

The following recovery activities have also been identified for this species (OEH 2015a):

1. Protect areas of known habitat from disturbance;
2. Protect remaining areas of habitat from clearing and development;
3. Control weeds in areas of known habitat;
4. Always stay on designated four-wheel drive tracks;
5. Regenerate areas of known habitat, including planting of local rainforest species to protect Scented Acronychia from exposure to salt-laden winds;
6. Monitor population dynamics and threats of known populations;
7. Exclude domestic stock from known habitat;
8. Implement appropriate fire regime for habitat in which the species occurs;
9. Provide advice to consent and planning authorities about the location and ecological requirements of the species; and
10. Maintain viable ex-situ collection.

The proposal is largely 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.***

**Response:**

The proposed works contribute to the Key Threatening Process "Clearing of Native Vegetation".

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