- migratory birds as the Site is not considered to represent important habitat or contain a ecologically significant proportion of the population.

iii Migratory species

The Osprey (*Pandion haliaetus*) and the Black-faced Monarch (*Monarcha melanopsis*) are listed as migratory species under the EPBC Act. The Black-faced Monarch is likely to occur in the eucalypt woodlands and coastal scrub of the proposed rezoning. It was recorded foraging in the Site during the survey but the area is likely to be part of a larger home range. The Osprey was recorded flying over the Site during the survey. Foraging habitat for this species is available nearby to the east of the Site in the ocean, but is not present onsite.

An assessment of significance was completed for these species (Appendix C) which concluded that significant impacts were unlikely as an ecologically significant proportion of the species is not known to reside in the local area, and the Site does not contain important habitat for the species.

4.2.6 Key threatening processes

Key threatening processes (KTPs) are the events and processes that threaten, or could threaten, the survival or evolutionary development of species, populations or ecological communities. Thirty six KTPs are currently listed in NSW under the TSC Act and nineteen KTPs are listed under the EPBC Act. The proposed rezoning is unlikely to exacerbate any of the listed KTPs. The only KTP's that would be triggered by the rezoning would be clearing of native vegetation and loss of hollow-bearing trees, however this threat would also result with the development using the current zoning.

4.3 Recommended mitigation measures

The following mitigation measures are proposed to avoid and minimise impacts on threatened species, TECs and their habitat as a result of the proposed rezoning:

- all clearing of vegetation will be restricted to identified residential zoned areas and adjoining bushfire asset protection zones, and will be minimised where possible during detailed design of the development;
- noxious weeds should be controlled at the Site to minimise their spread into remnant bushland;
- the linkage of the northern and southern residential areas should be designed to reduce barriers to fauna movement, for example a bridge or culvert structure over the creek which allows for dry fauna passage;
- the areas to be zoned for environmental protection should be protected and enhanced, with disturbance from surrounding land uses and motorbike riders minimised;
- use of locally endemic species in any proposed plantings;
- minimising light spill from street lights into the environmental protection area;
- investigating options to discourage residential encroachment into surrounding bushland areas; and

- consideration of the need for restrictions in the new development on the keeping of companion animals (cats and dogs) to minimise potential impacts to fauna. This would be undertaken in the context of the effects of pets in existing developed areas and the incremental benefits of on-site restrictions.

Additional mitigation will be required during the next stage of the development. A detailed plan of management would be required for the areas zoned as environmental protection, detailing future management responsibilities and funding sources for its conservation and enhancement. This would include the provision of habitat features such as nest boxes.

A flora and fauna management plan should be completed prior to any construction activities at the Site. It should include the following:

- clearing protocols including pre-clearing surveys and two-stage clearing methods supervised by an ecologist or fauna rescuer;
- weed control prior to and during construction;
- sediment and erosion control during construction works; and
- methods to reduce the potential for the spread of soil pathogens and disease during construction.

5 Offsets

5.1 Offset requirements

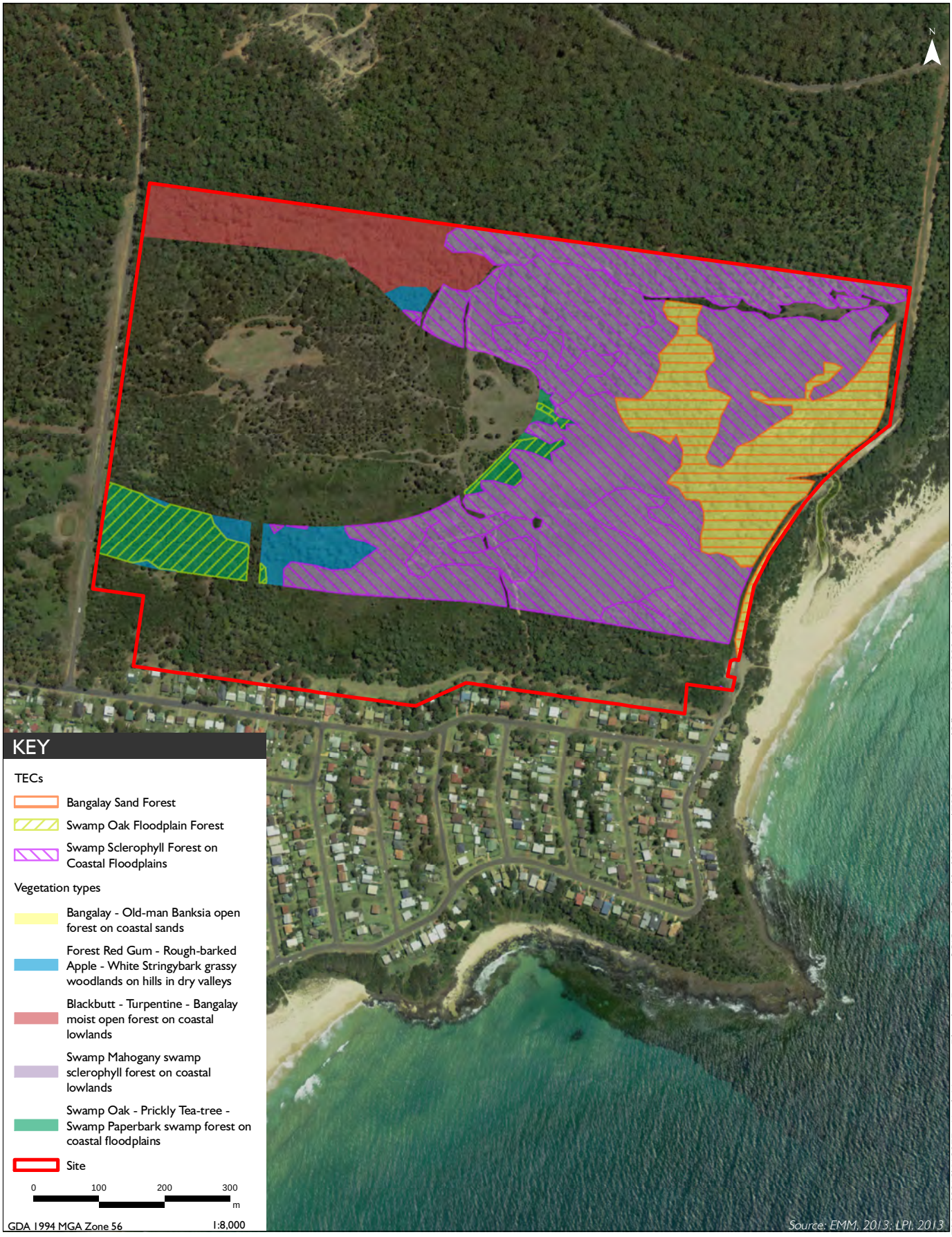
Offsets compensate for residual impacts that cannot be avoided or mitigated. The current zoning would remove more than 54% of the vegetation at the Site and result in greater impacts to TECs and threatened species habitat than the proposed rezoning. While the proposed rezoning reduces these impacts, it will still require the loss of ecological features on the Site. Therefore offsets have been included in the proposal to compensate for these impacts.

A review of recent development approvals with similar ecological constraints in the region has revealed that on average, an offset to impact ratio of 3:1 is required to compensate for the loss of threatened ecological communities. This ratio has been used to inform the proposed rezoning design to ensure that adequate areas remain at North Manyana to compensate for the subsequent development of the Site.

An overall offset to impact ratio of approximately 3:1 will be achieved for threatened ecological communities at North Manyana with the proposed rezoning changes (Table 5.1). The proposed offsets will be the remaining land zoned for environmental protection. These areas will be managed for conservation into the future.

Table 5.1 Offset to impact ratios for TECs and all vegetation at the Site

BVT	Vegetation Type	TEC	Proposed development area (ha)	Offset area onsite (ha)	Offset to impact ratio	Current zoning ratio
SR512	Bangalay - Old-man Banksia open forest on coastal sands	Bangalay Sand Forest	0	6.6	n/a	n/a
SR648	Swamp Mahogany swamp sclerophyll forest on coastal lowlands	Swamp Sclerophyll Forest	10.4	25.2	2.4:1	2.5:1
SR649	Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	Swamp Oak Floodplain Forest	1.3	2.6	2.0:1	0:1
Total TECs			**11.7**	**34.4**	**2.9:1**	**1.8:1**
Total all vegetation			**31.8**	**40.1**	**1.3:1**	**0.9:1**



Proposed offsets (environmental protection zoning)

North Manyana Rezoning Proposal: Ecological Assessment

Figure 5.1

6 Conclusion

North Manyana was cleared for agriculture during the 1950s to 1970s and now consists of regrowth vegetation representative of the communities which would have occurred prior to clearing. The Site is also subject to unauthorised access and use as a trail bike riding facility. This disturbance has cleared large areas through the central parts of the Site and led to the invasion of weeds.

Three of the vegetation communities present are considered to represent threatened ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act). Several bird and bat species, which are listed as threatened, were recorded at North Manyana during recent surveys. However, such species would use the Site for foraging habitat only as the Site generally lacks mature vegetation and important habitat features such as hollow-bearing trees, it only provides limited roosting and nesting habitat for such species.

The current zoning of the Site would allow the development of up to 41.5 ha or 54% of North Manyana. Of this area, 14.2 ha contains threatened ecological communities listed under the TSC Act. It would also allow for the development of the entire western part of the Site, which would prevent the movement of wildlife to surrounding habitat in the west from the remaining vegetation in the Site.

The planning proposal would allow for the development of 31.8 ha or 44% of the vegetated areas of North Manyana, of which 11.7 ha contains threatened ecological communities. This represents 9.7 ha or approximately 14% less of the vegetation at the Site than the current zoning. Rezoning also allows for the provision of compensatory habitat within the eastern part of the Site, and linking to remnant vegetation to the north and west, to achieve offset to impact ratios of approximately 3:1 for threatened ecological communities, which is in accordance with other developments in the area.

The proposed rezoning would result in fewer impacts to sensitive ecological features of the Site, as the current zoning would develop a greater area of threatened species habitat and threatened ecological communities. Assessments of significance under the TSC Act and EPBC Act, where relevant, were undertaken to determine if potential impacts from the proposed rezoning were likely to be significant. The assessments concluded that the proposed rezoning was unlikely to have a significant impact on any threatened biodiversity recorded at the Site or with the potential to occur, particularly as potential impacts were reduced in comparison to the potential impacts of the current zoning.

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Appendix A

Habitat Assessment Table

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Plants						
Austral Toadflax, Toadflax *Thesium australe*	SPRAT	V	V	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.	Kangaroo Grass occurs is present on well drained, sandy soils which are not suitable for this species. Unlikely to occur.	No
Biconvex Paperbark *Melaleuca biconvexa*	SPRAT	V	V	Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Resprouts following fire.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
East Lynne Midge-orchid *Genoplesium vernale*	SPRAT	V	V	Grows in 'poorer' dry sclerophyll woodland and forest on the south coast of New South Wales between Mogo and Ulladulla. Confined to areas with good drainage and shallow, low fertility soils. The plant exists only as a dormant tuber for part of the year, dying back after flowering and fruiting in mid November to late December. Has an ability to re-colonise previously disturbed sites.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Illawarra Greenhood *Pterostylis gibbosa*	SPRAT	E	E	Grows in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum (*Eucalyptus tereticornis*), Woollybutt (*E. longifolia*) and White Feather Honey-myrtle (*Melaleuca decora*). Near Nowra, the species grows in an open forest of Spotted Gum (*Corymbia maculata*), Forest Red Gum and Grey Ironbark (*E. paniculata*). It is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). It can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.	Potential habitat present, however no recent records nearby. No rosettes or flower stems were identified during the survey. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Leafless Tongue-orchid *Cryptostylis hunteriana*	SPRAT	V	V	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*). It appears to prefer open areas in the understorey and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*). Flowers December to February. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site.	Known to occur in surrounding areas and suitable habitat is present with other *Cryptostylis* species. Likely to occur.	Yes – additional surveys to be undertaken during the flowering period.
Magenta Lilly Pilly *Syzygium paniculatum*	OEH	E	V	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	No suitable habitat present. Unlikely to occur.	No
Siah's Backbone *Streblus pendulinus*	SPRAT	-	E	On the Australian mainland, Siah's Backbone is found in warmer rainforests, chiefly along watercourses. The altitudinal range is from near sea level to 800 m above sea level. The species grows in well developed rainforest, gallery forest and drier, more seasonal rainforest.	No suitable habitat present. Unlikely to occur.	No
Thick-lipped Spider Orchid *Caladenia tessellata*	SPRAT	E	V	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Villous Mintbush Prostanthera densa	OEH	V	V	Villous Mintbush generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea. Plants regenerate from rootstock after fire and flower within the first year or two.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Amphibians						

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Giant Burrowing Frog *Heleioporus australiacus*	SPRAT	V	V	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Individuals move into the breeding site either immediately before or following heavy rain and occupy these sites for up to 10 days. Breeds mainly in autumn, but has been recorded calling throughout the year. Egg masses are foamy with an average of approximately 500-800 eggs and are laid in burrows or under vegetation in small pools. After rains, tadpoles are washed into larger pools where they complete their development in ponds or ponded areas of the creekline. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Green and Golden Bell Frog *Litoria aurea*	NPWS Atlas	E	V	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.	Recorded at the Site over 15 years ago near the lagoon in the east. The lagoon was highly saline during the survey and unsuitable for this species. Unlikely to occur.	No
Littlejohn's Tree Frog, Heath Frog *Litoria littlejohni*	SPRAT	V	V	Breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground. Breeding is triggered by heavy rain and can potentially occur all year, but is usually from late summer to early spring when conditions are favourable.	No suitable habitat present. Unlikely to occur.	No
Birds						

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Australasian Bittern *Botaurus poiciloptilus*	OEH	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch	Potential habitat present near the lagoon in the east, however no recent records nearby. Unlikely to occur.	No
Barking Owl *Ninox connivens*	NPWS Atlas	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations it becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.	The Site may be part of a larger home range, but only provides limited foraging a no potential roosting habitat for this species.	No
Black Bittern *Ixobrychus flavicolli*	OEH	V	-	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. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. Generally solitary, but occurs in pairs during the breeding season, from December to March.	Potential habitat present near the lagoon in the east, however no recent records nearby. Unlikely to occur.	No
Brown Treecreeper *Climacteris picumnus victoriae*	NPWS Atlas	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Fallen timber is an important habitat component for foraging; with hollows in standing dead or live trees and tree stumps are essential for nesting.	The Site provides only limited suitable habitat for this species due to the lack of hollow-bearing trees and fallen timber. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Eastern Bristlebird *Dasyornis brachypterus*	SPRAT	E	E	Habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years. Shy and cryptic and rarely flies, although can be seen scampering over the ground; when approached, may move to a lookout perch 1 m or more above the ground, then retreat into dense vegetation. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation. Two eggs are laid during August to February.	The Site was burnt in 2001 and therefore may not be suitable for this species. Unlikely to occur.	No
Eastern Ground Parrot *Pezoporus wallicus wallicus*	NPWS Atlas	V	-	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). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground. When flushed, birds fly strongly and rapidly for up to several hundred metres, at a metre or less above the ground. The coastal and subcoastal heathland and sedgeland habitats of the Ground Parrot are particularly fire-prone. Ground Parrots can re-colonise burnt habitat after 1-2 years and reach maximum densities after 15-20 years without fire. Home ranges of adult birds is typically 10 ha and overlapping with other birds, while juveniles have a significantly larger home range. There is no evidence of regular long-distance dispersal or migration events. Ground Parrots breed from September to December.	Potential habitat occurs in the east of the Site for this species.	Yes – however, habitat occurs outside the proposed residential development areas.
Gang-gang Cockatoo *Callocephalon fimbriatum*	NPWS Atlas	V	-	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.	Recorded flying over the south-western part of the Site.	Yes

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Glossy Black Cockatoo *Calyptorhynchus lathami*	NPWS Atlas	V	-	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1,000 m asl in which stands of She-oak species, particularly Black She-oak (*Allocasuarina littoralis*) occurs. Depends on large hollow-bearing eucalypts for nest sites.	Chewed *Allocasuarina* nuts identified across the Site.	Yes
Great Egret *Ardea alba*	SPRAT	-	Mi	Reported in swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels. The species usually frequents shallow waters.	Potential habitat present near the lagoon in the east, however no recent records nearby. Unlikely to occur.	No
Hooded Plover *Thinornis rubricollis*	NPWS Atlas	CE	-	Prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh. Hooded Plovers forage in sand at all levels of the zone of wave wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain. At night they favour the upper zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the season and water levels. Usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes. They often nest within 6 m of the fore-dune, mostly within 5 m of the high-water mark, but occasionally among or behind dunes. The nest is a scrape in the sand near debris, making it vulnerable to predators and beach disturbance.	Recorded on the foredunes associated with the lagoon entrance at Manyana Beach adjacent to the Site.	Yes
Lesser Sand Plover *Charadrius mongolus*	NPWS Atlas	V	-	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge.	No suitable habitat present. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Little Eagle *Hieraaetus morphnoides*	NPWS Atlas	V	-	Occupies open eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands of interior NSW are also used.	Potential foraging habitat present, but only likely to use the Site on occasion as part of a larger home range.	No
Little Lorikeet *Glossopsitta pusilla*	NPWS Atlas	V	-	Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs. Nests in proximity to feeding areas in hollows using nesting sites repeatedly for decades.	A pair was recorded on a number of locations across the Site. Considering the timing of the records, it is likely the pair is breeding close to the Site.	Yes
Little Tern *Sternula albifrons*	NPWS Atlas	E	-	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). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles.	No suitable habitat present on the Site.	No
Masked Owl *Tyto novaehollandiae*	NPWS Atlas	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1,100 m. It is a forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1,000 hectares. This species roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Known to occur in the locality. Potential foraging habitat occurs in the Site but would only use the Site on occasion as part of a larger home range.	Yes
Orange Bellied Parrot *Neophema chrysogaster*	SPRAT	CE	CE	On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. Birds forage in low samphire herbland or taller coastal shrubland. Diet mainly comprises seeds and fruits of sedges and salt-tolerant coastal and saltmarsh plants. Occasionally, flowers and stems are eaten. Orange-bellied Parrots are known to forage among flocks of Blue-winged Parrots. Recent records from unexpected places, including Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species. Birds seen in NSW in 2003 were foraging on weed species several hundred metres from the coast.	Potential habitat present near the lagoon in the east, however no recent records nearby. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Osprey *Pandion haliaetus*	NPWS Atlas	V	-	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. Incubation of 2-3 eggs, usually by the female, is about 40 days. Female remains with young almost until they fly, usually after about nine weeks in the nest.	Recorded incidentally flying over the Site during the survey. No suitable nest or feed trees occur in the Sites.	Yes
Painted Snipe (Australian subsp) *Rostratula benghalensis australis*	SPRAT	E	V	Prefers fringes of swamps, dams and nearby marshy areas where there is cover. Forages nocturnally on mud-flats and in shallow water.	Potential habitat present near the lagoon in the east, however no recent records nearby. Unlikely to occur.	No
Pied Oystercatcher Haematopus longirostris	NPWS Atlas	E	-	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January.	Potential habitat present near the lagoon in the east, and recorded on the dunes to the east of the Site.	Yes
Pink Robin Petroica rodinogaster	NPWS Atlas	V	-	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Breeds between October and January and can produce two clutches in a season. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down	Potential habitat present at the Site, but more likely to use more intact habitat in adjacent conservation areas. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Powerful Owl Ninox strenua	NPWS Atlas	V	-	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Black She-oak (*Allocasuarina littoralis*), Rough-barked Apple (*Angorphora floribunda*), Cherry Ballart (*Exocarpus cupressiformis*) and a number of eucalypt species. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Known to occur in the locality. Potential foraging habitat occurs in the Site but would only use the Site on occasion as part of a larger home range.	Yes
Rainbow Bee-eater Merops ornatus	SPRAT	-	Mi	The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages.	Potential habitat present at the Site, but more likely to use more intact habitat in adjacent conservation areas. Unlikely to occur.	No
Red Goshawk Erythrotriorchis radiatus	SPRAT	CE	-	Red Goshawks 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. The birds lay clutches of 1-2 eggs, in a stick nest in a tall tree (>20 m tall) within 1 km of a watercourse or wetland. In winter in eastern Australia, the birds appear to move from nesting sites in the ranges to coastal plains, where they are associated with permanent wetlands.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Regent Honeyeater Anthochaera phrygia	NPWS Atlas	CE	E	This species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum and White Box.	Potential habitat present at the Site, but more likely to use more intact habitat in adjacent conservation areas. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Sooty Owl Tyto tenebricosa	NPWS Atlas	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*). Nests in very large tree-hollows.	Known to occur in the locality. Potential foraging habitat occurs in the Site but would only use the Site on occasion as part of a larger home range.	Yes
Sooty Oystercatcher Haematopus fuliginosus	NPWS Atlas	V	-	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	Potential habitat present near the lagoon in the east, and recorded on the dunes to the east of the Site.	Yes
Square-tailed Kite *Lophoictinia isura*	NPWS Atlas	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. Appears to occupy large hunting ranges of more than 100 km^2.	Recorded foraging in the Site during the survey. Likely to be part of a larger home range.	Yes
Swift Parrot Lathamus discolor	SPRAT	E	E	Found in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta)*, Spotted Gum (*Corymbia maculate)*, Red Bloodwood (*C. gummifera)*. Commonly used lerp infested trees include Blackbutt (*E. pilularis).*	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Varied Sittella Daphoenositta chrysoptera	NPWS Atlas	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Potential habitat present at the Site, but more likely to use more intact habitat in adjacent conservation areas. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
White-footed Dunnart Sminthopsis leucopus	OEH	V	-	The White-footed Dunnart is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure. It is patchily distributed across these habitats and, where present, typically occurs at low densities. The White-footed Dunnart shelters in bark nests in hollows understanding or fallen timber, burrows in the ground, piles of logging debris, large grass clumps such as provided by Grass Trees (*Xanthorrhoea* spp.) and Cycads (*Macrozamia* spp.) and rock crevices.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Black-faced Monarch Monarcha melanopsis	SPRAT	-	Mi	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. Resident in the north of its range, but is a summer breeding migrant to coastal south-eastern Australia, arriving in September and returning northwards in March. It may also migrate to Papua New Guinea in autumn and winter.	Recorded foraging in the Site during the survey. Likely to be part of a larger home range.	Yes
Cattle Egret Ardea ibis	SPRAT	-	Mi	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation. The Cattle Egret roosts in trees, or amongst ground vegetation in or near lakes and swamps. It has also been recorded roosting near human settlement and industrial areas in Murwillumbah, NSW.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Great Egret Ardea modesta	SPRAT	-	Mi	The Eastern Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). The species usually frequents shallow waters. The Eastern Great Egret may retreat to permanent wetlands or coastal areas when other wetlands are dry (for example, during drought). This may occur annually in some regions with regular wet and dry seasons or erratically where the availability of wetland habitat is also erratic.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Latham's Snipe Gallinago hardwickii	SPRAT	-	Mi	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2,000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. They usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat (Naarding 1983). As such, snipe may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, button-grass plains, alpine herbfields and open forest.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Rufous Fantail Rhipidura rufifrons	SPRAT	-	Mi	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Satin Flycatcher Myiagra cyanoleuca	SPRAT	-	Mi	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, tall forests, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1,400 m above sea level. Satin Flycatchers are mainly recorded in eucalypt forests, especially wet sclerophyll forest, often dominated by eucalypts.	Limited potential habitat present, however no recent records nearby. Unlikely to occur.	No
White-bellied Sea-Eagle Haliaeetus leucogaster	SPRAT	-	Mi	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Breeding territories are located close to water, and mainly in tall open forest or woodland, although nests are sometimes located in other habitats such as dense forest (including rainforest), closed scrub or in remnant trees on cleared land. The White-bellied Sea-Eagle generally forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore, where they forage over in-shore waters.	Potential habitat present, however no recent records nearby. Unlikely to use the Site for foraging or breeding habitat.	No
White-throated Needletail Hirundapus caudacutus	SPRAT	-	Mi	In Australia, the White-throated Needletail is almost exclusively aerial. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes. The species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
Mammals						

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Brush-tail Rock-wallaby Petrogale penicillata	SPRAT	E	V	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Highly territorial and have strong site fidelity with an average home range size of about 15 ha.	Unlikely to occur.	No
Brush-tailed Phascogale Phascogale tapoatafa	OEH	V	-	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest .Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. Feeds mostly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates. Nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. Mating occurs May - July; males die soon after the mating season whereas females can live for up to three years but generally only produce one litter.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No
East-coast Freetail Bat Mormopterus norfolkensis	NPWS Atlas	V	-	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	Recorded onsite. Potential foraging habitat occurs in the Site but only limited roosting habitat.	Yes
Eastern Bentwing-bat Miniopterus schreibersii oceanensis	NPWS Atlas	V	-	Occurs in dry sclerophyll forest, open woodland and open grasslands. Roosts in caves but also uses manmade structures such as disused mine tunnels and road culverts. This species is known to intermittently use the nearby Wellington Caves as roosting habitat.	Recorded onsite. Potential foraging habitat occurs in the Site but no roosting habitat.	Yes
Eastern False Pipstrelle Falsistrellus tasmaniensis	NPWS Atlas	V	-	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	Recorded onsite. Potential foraging habitat occurs in the Site but only limited roosting habitat.	Yes

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Greater Broad-nosed Bat Scoteanax ruepellii	NPWS Atlas	V	-	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	Recorded onsite. Potential foraging habitat occurs in the Site but only limited roosting habitat.	Yes
Grey-headed Flying-fox Pteropus poliocepahlus	SPRAT	V	V	Distributed along the east coast roosting in dense vegetation greater than 3 m in height. In summer, camps may number in the thousands, depending upon local eucalypt blossom, rainforest fruit or fruit crop availability. In winter, adults migrate north to feed on Swamp Mahogany (*Eucalyptus robusta*), a winter-flowering eucalypt.	Potential habitat present, however no recent records nearby. No camps identified in proximity to the Site.	No
Koala Phascolarctos cinereus	NPWS Atlas	V	-	Inhabit eucalypt woodlands and forests. 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. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees.	Some potential feed trees present, however no signs of use were observed and no animals were recorded. Unlikely to occur.	No
Large-eared Pied Bat Chalinolobus dwyeri	SPRAT	V	V	This species roosts in caves and crevices in cliffs and mines, preferring the twilight areas not far from the entrance. Males can roost alone or in small groups in winter during torpor. Females form maternity colonies from November to February in the roof domes of sandstone caves. Most frequently associated with Box Gum Woodlands or creek flats.	Potential foraging habitat occurs in the Site but no roosting habitat.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Little Bentwing Bat Miniopterus australis	none	V	-	Generally found in well-timbered areas including moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and Banksia scrub. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (Miniopterus schreibersii) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring. Males and juveniles disperse in summer.	Recorded onsite. Potential foraging habitat occurs in the Site but only limited roosting habitat.	Yes
Long-nosed Potoroo Potorous tridactylus tridactylus	NPWS Atlas	V	V	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. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. Breeding peaks typically occur in late winter to early summer and a single young is born per litter.	Potential habitat present. Moderate potential to occur given nearby records.	Yes
New Holland Mouse Pseudomys novaehollandiae	SPRAT	-	V	This species shows a preference for soft sandy substrates in which to make their burrow, a layer of heath to 1 m in height and sparse groundcover. This species begins to colonise burnt areas one year after fire and mined areas after four to five years.	Potential habitat present, however no recent records nearby. Unlikely to occur.	No

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Southern Brown Bandicoot Isoodon obesulus obesulus	NPWS Atlas	E	E	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material.	Potential habitat present. Moderate potential to occur given nearby records.	Yes
Southern Myotis Myotis macropus	NPWS Atlas	V	-	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. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December	Potential foraging habitat occurs in the Site but no roosting habitat.	No
Spotted-tailed Quoll Dasyurus maculatus	NPWS Atlas	V	V	Utilises a range of habitats including open forest and open woodland. Commonly associated with gullies, rocky escarpments and outcrops. The spotted-tailed quoll shelters during the day in dens located in caves, among rocks, hollow logs; low tree hollows and burrows. Spotted-tailed quolls are solitary, with females defending exclusive home range territories (600–1,000 ha), whereas males have larger and undefended home ranges, which overlap a number of female home ranges (2,000–4,500 ha).	Potential habitat present. Moderate potential to occur given nearby records.	Yes
Squirrel Glider Petaurus norfolcensis	NPWS Atlas	V	-	The Squirrel Glider has been recorded from mixed species box woodland and open forest dominated by species such as Grey Box, White box and Yellow Box. Squirrel Gliders are often seen in linear reserves of remnant vegetation along roadsides or stream reserves. An important component of the Squirrel Glider habitat at sites where the species has been regularly recorded is the presence of many large, old trees containing suitable hollows for nesting and refuge. Dead trees are also known to be used as den sites.	Potential habitat present. Moderate potential to occur given nearby records and use the Site for foraging.	Yes

Table A.1 Threatened species assessment table

Species	Source	Status		Habitat requirements (OEH 2012b)	Likelihood of occurrence	Further assessment required?
		TSC Act	EPBC Act			
Yellow-bellied Glider Petaurus australis	NPWS Atlas	V	-	Occur 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. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Live in small family groups of two - six individuals and are nocturnal. Den, often in family groups, in hollows of large trees. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	Potential habitat present. Moderate potential to occur given nearby records and use the Site for foraging.	Yes

Notes: SPRAT – Species profile and threat database (DSEWPC 2012); V – vulnerable, E – endangered, CE – critically endangered, Mi – migratory.

Appendix B

Species Recorded

Table B.1 Flora species recorded in the Site

Genus	Scientific Name	Common Name
APIACEAE	*Hydrocotyle bonariensis**	Pondweed
APOCYNACEAE	*Parsonsia straminea*	Common Silkpod
APOCYNACEAE	*Tylophora barbata*	Bearded Tylophora
ARACEAE	*Zantedeschia aethiopica**	Arum Lily
ARALIACEAE	*Astrotricha floccosa*	-
ARALIACEAE	*Astrotricha latifolia*	Broad-leaved Star Hair
ASPARAGACEAE	*Asparagus aethiopicus*	Asparagus Fern
ASPARAGACEAE	*Myrsiphyllum asparagoides**	Willdenow
ASTERACEAE	*Bidens pilosa**	Cobblers Pegs
ASTERACEAE	*Chrysanthemoides monilifera**	Bitou Bush
ASTERACEAE	*Conyza bonariensis**	Fleabane
ASTERACEAE	*Hypochaeris radicata**	Cat's Ear
ASTERACEAE	*Onopordum acanthium*	Scotch thistle
ASTERACEAE	*Sonchus oleraceus*	Common Sowthistle
ASTERACEAE	*Taraxacum officionalis*	Dandelion
CAMPANULACEAE	*Wahlenbergia gracilis*	Native Bluebell
CASUARINACEAE	*Allocasuarina distyla*	Scrub She-Oak
CASUARINACEAE	*Allocasuarina littoralis*	Black She-Oak
CASUARINACEAE	*Casuarina glauca*	Swamp Oak
CHENOPODIACEAE	*Einadia sp.*	Saltbush
CLUSIACEAE	*Hypericum gramineum*	Small St Johns Wort
COMMELINACEAE	*Commelina cyanea*	Native Wandering Jew
COMMELINACEAE	*Tradescantia fluminensis**	Wandering Jew
CONVOLVULACEAE	*Calystegia marginata*	Forest Bindweed
CONVOLVULACEAE	*Conolvus sp.*	Bindweed
CONVOLVULACEAE	*Convolvus erubescens*	Australian Bindweed
CONVOLVULACEAE	*Dichondra repens*	Kidney Weed
CONVOLVULACEAE	*Polymeria calycina*	Slender Bindweed
CUNONIACEAE	*Callicoma serratifolia*	Black Wattle
CYATHEACEAE	*Cyathea australis*	Rough Treefern
CYPERACEAE	*Baumea juncea*	Jointed Twig-rush
CYPERACEAE	*Carex breviculmis*	Short-stem Sedge
CYPERACEAE	*Cyperus imbecillis*	-
CYPERACEAE	*Gahnia clarkei*	Tall Saw Sedge
CYPERACEAE	*Gahnia melanocarpa*	Black-fruit Saw Sedge
CYPERACEAE	*Gahnia radula*	Thatch Saw Sedge
CYPERACEAE	*Isolepis nodosa*	Knobby Club Rush
CYPERACEAE	*Lepidosperma gunnii*	Narrow Swordsedge
CYPERACEAE	*Lepidosperma laterale*	Flat Sword Sedge
CYPERACEAE	*Schoenus brevifolius*	Zig-zag Bog-rush
DENNSTAEDTIACEAE	*Pteridum esculentum*	Bracken

Table B.1 Flora species recorded in the Site

Genus	Scientific Name	Common Name
DICKSONIACEAE	*Calochlaena dubia*	Rainbow Fern
DILLENIACEAE	*Hibbertia acicularis*	Prickly Guinea Flower
DILLENIACEAE	*Hibbertia aspera*	Rough Guinea Flower
DILLENIACEAE	*Hibbertia obtusifolia*	Hoary Guinea Flower
DILLENIACEAE	*Hibbertia scandens*	Climbing Guinea Flower
DROSERACEAE	*Drosera sp.*	Sundew
ELAEOCARPACEAE	*Elaeocarpus reticulatus*	Blueberry Ash
EUPHORBIACEAE	*Homalanthus populifolius*	Bleeding Heart
FABACEAE	*Acacia binervata*	Two-veined Hickory
FABACEAE	*Acacia elongata*	Swamp Wattle
FABACEAE	*Acacia longifolia*	Sydney Golden Wattle
FABACEAE	*Acacia mearnsii*	Black Wattle
FABACEAE	*Daviesia ulicifolia*	Gorse Bitter Pea
FABACEAE	*Glycine clandestina*	Twining Glycine
FABACEAE	*Glycine microphylla*	Small-leaf Glycine
FABACEAE	*Hardenbergia violaceae*	False Sarsparilla
FABACEAE	*Indigofera australis*	Australian Indigo
FABACEAE	*Kennedia rubicunda*	Dusky Coral Pea
FABACEAE	*Pultenaea bakelyi*	Blakely's Bush-pea
FABACEAE	*Pultenaea daphnoides*	Large-leaf Bush-pea
FABACEAE	*Pultenaea flexilis*	Graceful Bush-pea
FABACEAE	*Pultenaea linophylla*	Halo Bush-pea
FABACEAE	*Pultenaea retusa*	Notched Bush-Pea
FABACEAE	*Senna pendula**	Christmas Senna
FABACEAE	*Trifolium repens**	White Clover
GENTIANACEAE	*Centaurium tenuiflorum*	Slender Centaurium
GERANIACEAE	*Erodium sp.**	Stork's Bill
GERANIACEAE	*Geranium solanderi*	Native Geranium
GOODENIACEAE	*Goodenia billardifolia*	Daisy-leaved Goodenia
GOODENIACEAE	*Goodenia heterophylla*	Variable-leaved Goodenia
GOODENIACEAE	*Goodenia paniculata*	Swamp Goodenia
GOODENIACEAE	*Goodenia sp.*	-
HALORAGACEAE	*Gonocarpus teucrioides*	Raspwort
JUNCACEAE	*Juncus kraussii*	Sea Rush
JUNCACEAE	*Juncus subsecundus*	Finger Rush
LAMIACEAE	*Plectranthus parviflorus*	Cockspur Flower
LAURACEAE	*Cassytha glabella*	Devil's Twine
LINDSAEACEAE	*Lindsaea microphylla*	Lacy Wedge Fern
LOBELIACEAE	*Pratia purpurescens*	Whiteroot
LOMANDRACEAE	*Lomandra longifolia*	Spiny-headed Mat-rush
LOMANDRACEAE	*Lomandra multiflora*	Many-flowered Mat-rush

Table B.1 Flora species recorded in the Site

Genus	Scientific Name	Common Name
LUZURIAGACEAE	*Eustrephus latifolius*	Wombat Berry
LUZURIAGACEAE	*Geitonoplesium cymosum*	Scrambling Lily
MALVACEAE	*Modiola caroliniana*	Red-flowered Mallow
MELIACEAE	*Synoum glandulosum*	Scentless Rosewood
MYRTACEAE	*Angophora floribunda*	Rough-barked Apple
MYRTACEAE	*Callistemon linearis*	Narrow-leaved Bottlebrush
MYRTACEAE	*Eucalyptus baueriana*	Blue Box
MYRTACEAE	*Eucalyptus botryoides*	Bangalay
MYRTACEAE	*Eucalyptus botryoides x saligna*	Bastard Mahogany
MYRTACEAE	*Eucalyptus globoidea*	White Stringybark
MYRTACEAE	*Eucalyptus longifolia*	Woolybutt
MYRTACEAE	*Eucalyptus paniculata*	Grey Ironbark
MYRTACEAE	*Eucalyptus pilularis*	Blackbutt
MYRTACEAE	*Eucalyptus piperita*	Sydney Peppermint
MYRTACEAE	*Kunzea ambigua*	Tick Bush
MYRTACEAE	*Leptospermum juniperinum*	Prickly Tea-tree
MYRTACEAE	*Leptospermum laevigatum*	Coast Tea-tree
MYRTACEAE	*Leptospermum polygalifolium*	Tantoon
MYRTACEAE	*Melaleuca ericifolia*	Swamp Paperbark
MYRTACEAE	*Melaleuca hypericifolia*	Hillock Bush
MYRTACEAE	*Melaleuca linariifolia*	Flax-leaved Paperbark
MYRTACEAE	*Melaleuca thymifolia*	Thyme Honey-myrtle
MYRTACEAE	*Syncarpia glomuliferum*	Turpentine
OLEACEAE	*Notelaea longifolia*	Large Mock-olive
ORCHIDACEAE	*Caladenia carnea*	Pink Fairy
ORCHIDACEAE	*Corybas sp.*	Helmet Orchid
ORCHIDACEAE	*Cryptostylis subulata*	Large Tongue-orchid
ORCHIDACEAE	*Cymbidium suave*	Snake Orchid
ORCHIDACEAE	*Pterostylis pedunculata*	Maroonhood
OXALIDACEAE	*Oxalis corniculata*	Creeping Woodsorrel
OXALIDACEAE	*Oxalis exilis*	Shady Woodsorrel
PHORMIACEAE	*Dianella caeruea*	Blue Flax-lily
PHORMIACEAE	*Stypandra glauca*	Nodding Blue Lily
PHORMIACEAE	*Thelionema caespitosum*	Tufted Blue Lily
PHYLLANTHACEAE	*Berynia oblongifolia*	Breynia
PITTOSPORACEAE	*Billardiera scandens*	Hairy Apple Berry
PITTOSPORACEAE	*Pittosporum revolutum*	Wild Yellow Jasmine
PITTOSPORACEAE	*Pittosporum undulatum*	Sweet Pittosporum
POACEAE	*Andropogon virginicus*	Whisky Grass
POACEAE	*Austrostipa sp.*	A speargrass
POACEAE	*Briza minor**	Shivery Grass

Table B.1 Flora species recorded in the Site

Genus	Scientific Name	Common Name
POACEAE	*Cynodon dactylon*	Couch
POACEAE	*Deyeuxia quadriseta*	Reed Bent-grass
POACEAE	*Entolasia marginata*	Bordered Panic
POACEAE	*Entolasia stricta*	Wiry Panic
POACEAE	*Eragrostis brownii*	Brown's Love Grass
POACEAE	*Imperata cylindrica*	Blady Grass
POACEAE	*Microleana stipoides*	Weeping Grass
POACEAE	*Oplismenus aemulus*	Basket Grass
POACEAE	*Panicum simile*	Two-colour Panic
POACEAE	*Paspalidium sp.*	-
POACEAE	*Paspalum dilatatum*	Paspalum
POACEAE	*Poa labillardierei*	Tussock
POACEAE	*Setaria gracilis**	Slender Pigeon Grass
POACEAE	*Sporobolus sp.*	-
POACEAE	*Stenotaphrum secundatum**	Buffalo Grass
POACEAE	*Themeda australis*	Kangaroo Grass
PROTEACEAE	*Banksia ericifolia*	Heath-leaved Banksia
PROTEACEAE	*Banksia integrifolia*	Coast Banksia
PROTEACEAE	*Banksia paludosa*	Swamp Banksia
PROTEACEAE	*Hakea laevipes*	Broad-leaf Hakea
PROTEACEAE	*Hakea sericea*	Needlebush
PROTEACEAE	*Hakea teretifolia*	Needlebush
PROTEACEAE	*Persoonia linearis*	Narrow-leaved Geebung
PTERIDACEAE	*Adiantum aethiopicum*	Maidenhair Fern
ROSACEAE	*Rubus fruiticosus**	Blackberry
ROSACEAE	*Rubus parvifolius*	Native Raspberry
RUBIACEAE	*Morinda jasminoides*	Sweet Morinda
RUBIACEAE	*Opercularia aspera*	Thin Stink Weed
RUBIACEAE	*Opercularia diphylla*	Thin-leaf Stink Weed
SANTALACEAE	*Exocarpus cupressiformis*	Cherry Ballart
SAPINDACEAE	*Cupaniopsis anacardioides*	Tuckeroo
SAPINDACEAE	*Dodonea triquetra*	Hop Bush
SOLANACEAE	*Solanum sp.*	-
SOLANACEAE	*Solanum stelligerum*	Devil's Needles
THYMELAEACEAE	*Pimelea linifolia*	Slender Rice Flower
VERBENACEAE	*Lantana camara**	Lantana
VERBENACEAE	*Verbena sp. **	Purpletop
VIOLACEAE	*Viola hederacea*	Ivy-leaved Violet
VITACEAE	*Cissus antarctica*	Kangaroo Grape
VITACEAE	*Cissus sterculiifolia*	Yaroong
XANTHORRHOEACEAE	*Xanthorrhoea sp.*	Grasstree