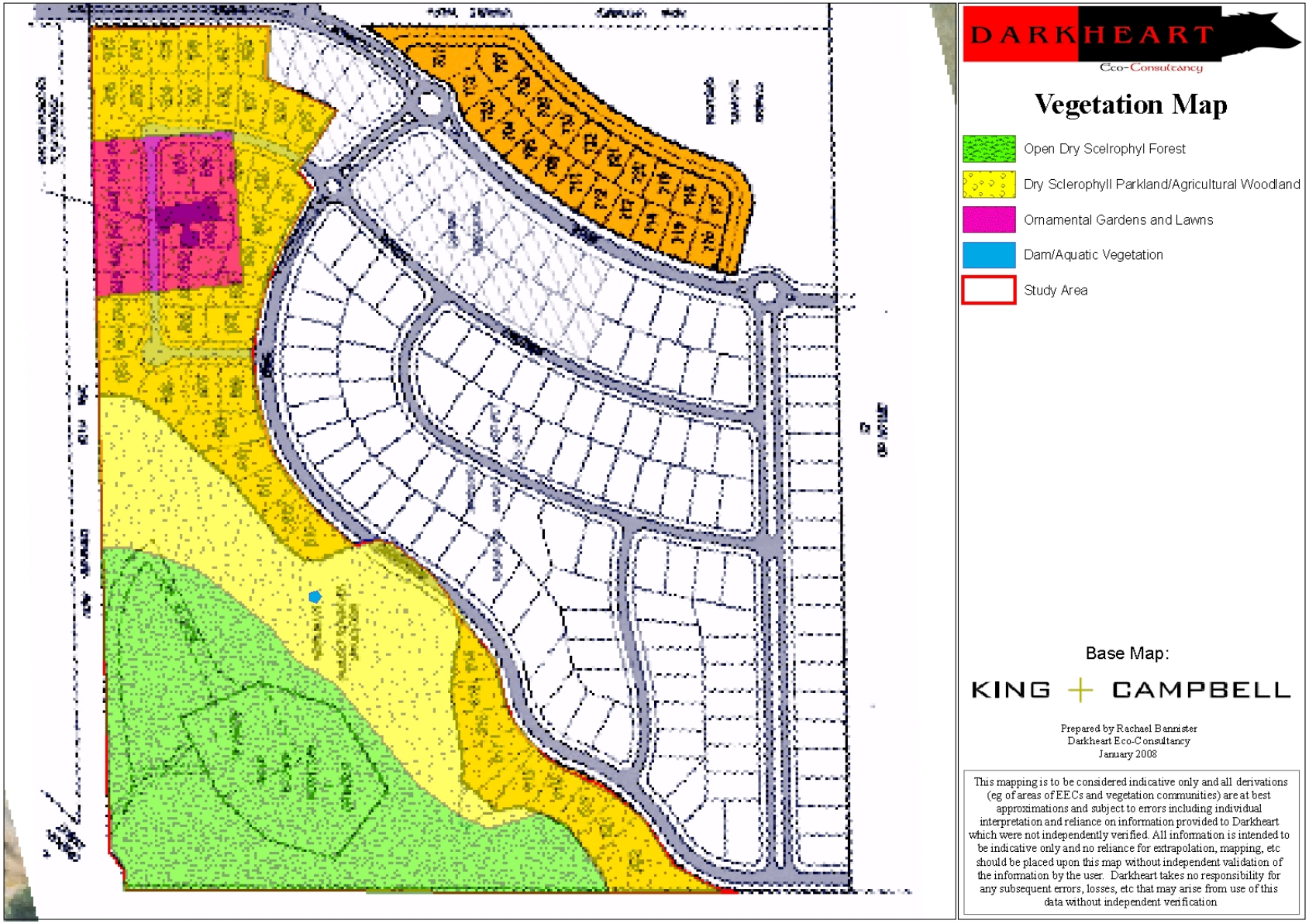
Figure 3: Site vegetation map
(base map provided by King and Campbell Pty Ltd)



3.2 FLORA OF CONSERVATION SIGNIFICANCE

3.2.1 Threatened Species

3.2.1.1 Targeted Searches Results

No threatened flora species were recorded on the site/study area by the survey.

3.2.1.2 Assessment of Threatened Species Occurrence Probability

3.2.1.2.1 Atlas of Wildlife/Bionet/Literature Records

Appendix 1 evaluates the potential occurrence of threatened flora species considered potential occurrences in the locality.

In regards to the potential occurrence of threatened flora, it should be noted that threatened plants often occur in habitats with a precise mix of essential ecological requirements, and not randomly in the landscape or a broad structural form of vegetation (eg dry sclerophyll forest). Such essential requirements may be a complex nexus of position, soil type (which affects fertility, acidity, etc) and climate, but may also include specific (sometimes symbiotic) association with fungi and bacteria (eg Proteaceae), dispersal vectors (eg bats) and disturbance regimes eg *Acacia aprica* will not recruit without a suitable fire regime (Vallee *et al* 2004). Absence of such essential habitat variables or their modification (eg by disturbance such as frequent fire) can thus reduce or negate a site's potential for such plants to occur. These often poorly understood ecological factors are also a major contributor in the reason that many translocations of threatened plants fail (Vallee *et al* 2004).

3.2.1.2.2 Conclusion

The study site demonstrates signs of a range of disturbances including extensive and at times very intensive clearing, logging and horticultural activities. The impacts of clearing/logging are clearly evident when comparing vegetation communities on site with more mature and floristically diverse habitats on adjacent land to the south and west. It is considered likely that the disturbances to the site have resulted in habitat changes (eg to microclimates, soil characteristics, etc) that may have effectively precluded threatened flora species from occurring on the site.

The above and survey results appear to suggest that the presence of a population of threatened plants on site is most unlikely due to lack of other proximate populations, disturbance history and/or suitable habitat. Consequently, no threatened plant was considered a significant potential occurrence in Appendix 1.

3.2.2 Ecological Communities and Populations

3.2.2.1 Site Recorded Endangered Ecological Communities (EECs)

No EECs listed under the TSCA or EPBCA were recorded on the site. No EECs occur in the study area, although the EEC – *Swamp Sclerophyll Forest* occurs on adjacent land to the far northeast on the floodplain of Saltwater Lagoon.

3.2.2.2 Other Listed EECs and Endangered Populations

At the time of writing, the following were listed (www.npws.nsw.gov.au accessed 13/12/07):

1. ***"Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions"*** is an EEC associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Swamp Oak

Floodplain Forest (SOFF) generally occurs below 20 m (rarely above 10 m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. SOFF has a dense to sparse tree layer in which Swamp Oak (*Casuarina glauca)* is the dominant species. Other trees including *Acmena smithii, Glochidion* spp. and *Melaleuca* spp. may be present as subordinate species. The understorey is characterised by frequent occurrences of vines ie *Parsonsia straminea, Geitonoplesium cymosum* and *Stephania japonica* var. *discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.

The study area does not contain any of the required geomorphological characteristics or the recognised floristic association.

2. "***Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions***" is an EEC associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. *Swamp Sclerophyll Forest* (SSF) *on Coastal Floodplains* generally occurs below 20 m (though sometimes up to 50 m) elevation, often on small floodplains or where the larger floodplains adjoin lithic substrates or coastal sand plains. The structure of the community is typically open forest (but may be reduced to scattered trees via disturbance), and in some areas the tree stratum is low and dense ie a scrub. The community also includes some areas of fernland and tall reedland or sedgeland where trees are very sparse or absent. The most widespread and abundant dominant trees include *Eucalyptus robusta* and *Melaleuca quinquenervia*. Other trees may be scattered throughout at low abundance or which may be locally common at few sites include *Callistemon salignus, Casuarina glauca, Eucalyptus resinifera* subsp. *hemilampra, Livistona australis* and *Lophostemon suaveolens*.

   The study area does not contain any of the required geomorphological characteristics or the recognised floristic association.

3. ***"River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions"*** is an EEC associated with silts, clay-loams and sandy loams on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. *River-Flat Eucalypt Forest on Coastal Floodplains* (RFEF) generally occurs below 50m elevation, but may occur on localised river flats up to 250m above sea level. In the North Coast, the most widespread and abundant dominant trees include *Eucalyptus tereticornis, E. amplifolia, Angophora floribunda, A. subvelutina* (broad-leaved apple), *E. saligna* and *E. grandis*.

   The study area does not contain any of the required geomorphological characteristics or the recognised floristic association.

4. ***"Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion"*** is a characteristic ecological community listed as Endangered. This Endangered Ecological Community (EEC) is associated with clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Subtropical Coastal Floodplain Forest (SCFF) generally occurs below 50 m, but may occur on localised river flats up to 250 m elevation in the NSW North Coast bioregion. While the composition of the SCFF tree stratum varies considerably, the most widespread and abundant dominant canopy trees include *Eucalyptus tereticornis, E. siderophloia, Corymbia intermedia*, and *Lophostemon suaveolens* (latter only north of the Macleay floodplain).

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The study area does not contain any of the required geomorphological characteristics or the recognised floristic association.

5. ***"Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions"*** is an EEC associated with periodic or semi-permanent inundation by freshwater, (including areas with minor saline influence). They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains ie habitats where flooding is periodic and standing freshwater persists for at least part of the year in most years. *Freshwater Wetlands on Coastal Floodplains* (FWCF) generally occur below 20m elevation, and the structure of the community varies from sedgelands and reedlands to herbfields. Woody plants are generally scarce. The structure and composition of the community varies both spatially and temporally depending on the water regime (Yen and Myerscough 1989, Boulton and Brock 1999). Artificial wetlands created on previously dry land or in former other EECs are specifically for purposes such as sewerage treatment, stormwater management and farm production are not regarded as part of this community (David Keith, DEC, pers. comm.).

   No part of the site or study area qualified as this EEC as the characteristic plant association or biophysical habitat is not present.

6. "***Lowland Rainforest on Floodplain on the NSW North Coast Bioregion***" is a characteristic ecological community listed as Endangered. This community has been recorded in the Kempsey, Hastings and Nambucca LGA.

   No part of the site or study area's vegetation qualified as this EEC as the characteristic plant association was not present.

7. A localised population of a distinctive variation of *Glycine clandestina*, identified as ***Glycine sp.*** "**Scotts Head**", has been listed as an **Endangered Population.** This population is restricted to part of the headland complex at Scotts Head.

   The site or study area is not located on or near this described population.

8. "***White Box Yellow Box Blakely's Red Gum Woodland***" is an EEC predicted to occur in Macksville, Dorrigo, Grafton, Kempsey, Korogoro Part, Nambucca, Coffs Harbour and Bare Part Atlas of Wildlife databases. This community is generally restricted to the tablelands and western slopes.

   The indicator species do not occur on the site or study area, thus this EEC does not occur.

9. The "***Population of Eucalyptus seeana in the Greater Taree Local Government Area***" has been listed as an Endangered Population. *E. seeana* does not occur on site. Furthermore the study site is located in the Kempsey LGA which is located outside the designation of the threatened population.

10. "***Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions***" has been listed as an EEC since March 2004 on Schedule 1 – Part 3 of the TSCA (1995). No littoral rainforest occurs on or adjacent to the site.

11. "***Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregion***" has been listed as an EEC under the TSCA 1995. Coastal Saltmarsh is the ecological community occurring in the intertidal zone on the shores of estuaries and lagoons along the NSW coast. Characteristic species include: *Baumea juncea, Juncus kraussii, Sarcocornia quinqueflora, Sporobolus virginicus, Triglochin striata, Isolepis nodosa, Samolus repens, Selliera radicans, Suaeda australis, Zoysia macrantha.* This community does not occur on or adjacent to the site.

12. "***Themeda* grassland on seacliffs and coastal headlands in the NSW North Coast, etc**" is an EEC listed in 2005. This EEC belongs to the Maritime Grasslands vegetation class of Keith (2004) and its structure is typically closed tussock grassland, but may be open shrubland or open heath with a grassy matrix between the shrubs. The community does not occur on or adjacent to the site.

13. "***Hunter Lowland Red Gum Forest in the Sydney Basin and North Coast Bioregions***" is predictively listed as an EEC listed for the all north coast LGAs. This community does not occur on or adjacent to the site.

14. "***Corymbia trachyphloia–Eucalyptus psammitica in the NSW North Coast Bioregion***" is preliminary listed as an EEC. This EEC "has a restricted distribution and is currently only known from the Coutts Crossing and Chambigne Nature Reserve area in the Pristine Waters local government area, but may occur elsewhere in the bioregion" The key indicator species - ***Corymbia trachyphloia* -** does not occur on or adjacent to the site.

15. "***Lowland Rainforest in the NSW North Coast Bioregion***" is a recently listed EEC which "may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. In the north of its range, Lowland Rainforest is found up to 600m above sea level". This EEC "in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes, give the canopy an irregular appearance (Floyd 1990). The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergents (e.g. *Eucalyptus grandis, E. saligna*) may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines."

    This EEC does not occur on the site or study area.

3.2.3 Conservation Status of Vegetation Communities

3.2.3.1 C.A.R. Assessment

The Comprehensive, Adequate and Representative (CAR) Assessment was completed in 1999-2000 for the Upper North East and Lower North East study areas (latter incorporating the local region). It was designed to assess Forest Ecosystem diversity, richness and extent of reservation in the broader context of the regional CAR reserve system design strategy.

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The following CAR Assessment communities are considered to best apply to the dry sclerophyll forest:

- #72 *Low Relief Coastal Blackbutt* is considered inadequately represented and Rare. This community is considered to have a moderate conservation value at a local, regional and state level.

- *#74 Lowlands Scribbly Gum* is considered inadequately represented. This community is considered Vulnerable and therefore has a moderate to high conservation value at a local, regional and state level.

3.3 FAUNA HABITAT DESCRIPTION AND EVALUATION

Refer to Appendix 1 for habitat requirements of relative cited threatened fauna.

3.3.1 Potential Habitat/Components For Threatened Species

3.3.1.1 Arboreal Habitat

3.3.1.1.1 Tree Hollows

Tree hollows are considered to be a critical habitat component for many threatened fauna (Gibbons and Lindenmayer 2002, Smith *et al* 1995, Austeco Pty Ltd 1994, NPWS 1999a, 2000a, etc).

ERM (2006b) provided an estimate of hollow abundance in the 7(a) zone. They recorded hollow apertures ranging from small (<5cm), medium (6-10cm), large (11-15cm) and very large (>16cm). Small hollows were most common. Small to medium hollows are preferred by Microchiropteran bats, Squirrel Gliders and Brushtail Phascogales, while larger hollows are required by Quolls, forest owls and the Glossy Black Cockatoo (Bird Australia 2001, Gibbons *et al* 2002,Cameron 2006, Gibbons and Lindenmayer 2002). ERM (2006b) estimated that some 60 hollow-bearing trees with over 245 hollows may occur in the 7(a) area (approximately 3.3ha). It should be noted however that hollow aperture size is not representative of internal dimensions (Gibbons and Lindenmayer 2002), hence the actual abundance of habitable hollows is likely to be less than estimated by ERM (2006b). Most fauna also exhibit denswapping ie using multiple hollows over the landscape due to predator evasion, parasite build-up, social matrices and varying qualities of the hollows eg presence of water, dimensions (eg capable of supporting a family group or individual)

Hollows also occur with less frequency in the 2(a) zone (as noted by ERM 2007). Six trees in the development footprint were noted to contain hollows or upturned knobs on the trunk which may contain hollows (see table 11).

Overall, hollows on site/property provide potential roosting, shelter and denning opportunities for a range of small to medium-large hollow obligated fauna (based on aperture diameter requirement), including threatened Microchiropteran bats, the Squirrel Glider, Yellow-Bellied Glider (*Petaurus australis*), Brushtailed Phascogale (*Phascogale tapoatafa*), and Spotted-Tailed Quoll (*Dasyurus maculatus*) (Gibbons and Lindenmayer 2002, Smith *et al* 1995, Austeco Pty Ltd 1994, Birds Australia 2004, Gibbons *et al* 2001). The fewer larger hollows present in the 7(a) zone may be structurally suitable for forest owls such as Barking Owl (*Ninox connivens*) and Masked Owl (*Tyto novaehollandiae*) or the Glossy Black Cockatoo.

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3.3.1.1.2 Nectar and Pollen Sources

Table 1 lists the main potential nectar and pollen food sources on site/property:

Table 2: Flowering periods of canopy and understorey species

SPECIES	FREQUENCY	FLOWERING SEASON
Corymbia intermedia	Uncommon	Late Summer-early Autumn
Eucalyptus planchoniana	Common	Summer
Eucalyptus signata	Dominant	Summer
Eucalyptus siderophloia	Very rare	Late Spring-early Summer
Eucalyptus microcorys	Occasional	Winter-early Summer
Eucalyptus pilularis	Dominant	Summer (sometimes Winter)

Winter flowering species are particularly critical for arboreal mammals (eg Squirrel Glider and Yellow-Bellied Glider – *Petaurus australis*) and nomadic nectarivores (eg Regent Honeyeater – *Xanthomyza phrygia*, Swift Parrot – *Lathumus discolor* and Grey Headed Flying Fox) due to the shortage of food resources in this period (Menkhorst *et al* 1999, Eby 2000a, 2000b, Smith *et al* 1995, Smith and Murray 2004, etc). As shown in the table above, the site/property is dominated by Summer flowering species. Tallowwood may be considered a significant flowering resource as it may flower in Winter. Overall though, the site/property has very limited potential to provide year round flowering sources due to the limited abundance and diversity Autumn-Spring flowering species, hence this may result in limited resources during this period.

3.3.1.1.2 Other Habitat Resources

The decorticating bark of Blackbutt and Scribbly Gum is considered to provide a good substrate for invertebrates. The deep fibrous bark of rough-barked species such as Needlebark may also provided good substrate for invertebrates, which in turn may provide potential foraging substrate for arboreal mammals (eg Yellow-Bellied Gliders and Squirrel Gliders - Braithwaite *et al* 1984, NPWS 2002b, Quinn 1995) and birds for invertebrate prey.

Pink Bloodwood and Scribbly Gum are potential preferred sap sources for the Yellow-Bellied Glider (Lindenmayer 2002, NPWS 1999, Smith *et al* 1995, NPWS 2003b). The Squirrel Glider and the common Sugar Gliders (*Petaurus breviceps*) also tap eucalypts for sap, with Pink Bloodwood, Scribly Gum and Grey Ironbark observed to be a very significant sap source at Crottys Lane, Kempsey (Berrigan 1999a), Arakoon (Berrigan 2000b, 2000g, 2000d, 2002e), western South West Rocks (Darkheart 2004f) and Gumma (Berrigan 2002c).

3.3.1.2 Microchiroptera (insectivores)

3.3.1.2.1 Foraging Opportunities

The site/study area/property offers a range of foraging opportunities for Microchiropteran bats due to the pattern of vegetation and structure as follows (Churchill 1998, DECC 2007b, ABS 2007, Smith *et al* 1995, Strahan 2000):

(i) <u>*Supra canopy zone*</u>: The continuous canopy over the dry sclerophyll forest is ideal for aerial intercept species flying over the canopy. Threatened species that could forage in this stratum are: Yellow-Bellied Sheathtail Bat (*Saccolaimus flaviventris*), Common Bent-Wing Bat (*Miniopterus schreibersii*), Little Bent-Wing Bat (*M. australis*), Hoary

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Bat (*Chalinolobus nigrogriseus*), Beccari's Freetail Bat (*Mormopterus beccarii*) and Eastern Freetail Bat (*M. norfolkensis*).

(ii) *Sub-canopy zone*: The agricultural woodland which dominates the site/study area lacks any significant understorey and provides potential foraging habitat for more manoeuvrable species or those that prefer more open habitats such as the Hoary Bat, Common Bent-Wing Bat, Little Bent-Wing Bat, Eastern Freetail Bat and Greater Broad-Nosed Bat (*Scoteanax rueppellii*).

(iii) *Forest interface*: The dry sclerophyll forest/woodland interface provides suitable structures for species that forage on the interface between forest and open areas, or hovering/gleaning species, such as Eastern Freetail Bat, Greater Broad-Nosed Bat, Common Bent-Wing Bat, Little Bent-Wing Bat and Hoary Bat.

(iv) *Aquatic*: The former dam on site is not considered suitable for foraging by the Southern Myotis as only a very small pool of water may develop due to the excavation of a channel on the dam wall.

3.3.1.2.2 Roosting Opportunities

There are no caves, cliffs, or overhangs on or adjacent to the site/property, which precludes species depending on such resources to breed or roost in, unless they are known to forage widely from such habitat components, or utilise alternative roosts (eg tree hollows) during non-breeding stages (and hence not depending on key maternity sites eg the Bent-Wing Bats). The nearest known caves are sea caves north of Smokey Cape (pers. obs.) which are not known major bat roosts.

As detailed previously, tree hollows are relatively common on and especially adjacent to the site with a good number considered structurally suitable for roosting by hollow-obligate bats (depending on a complex interaction of factors such as hollow microclimate, season, sex and life cycle stage of the bat species as well as predation risk and competition with other species – Churchill 1998, Smith *et al* 1995, Anna Lloyd, EcoLocation pers. comm.). Trees with decorticating bark (eg Blackbutt and less so Scribbly Gums) may also provide non-breeding roosting opportunities for species capable of utilising such resources (at least seasonally). Dwellings and sheds on and adjacent to the site may also offer some limited potential as roosts (Churchill 1998, DECC 2007b, Smith *et al* 1995, Strahan 2000).

3.3.2 Site/Study Area/Property's Habitat Limitations For Threatened Species

The site/study area/property lacked significant habitat or key habitat components for a range of threatened species eg no dense groundcover for the Common Planigale, no rainforest for the Wompoo Fruit-Dove, etc. These limitations are highlighted in the table below.

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Table 3: Limitations of site/study area's habitat for threatened species

HABITAT	STATE OF HABITAT ON SITE/STUDY AREA	THREATENED SPECIES AFFECTED
Groundcover	Poorly developed/absent: • Lack of cover/extensive cover. • Lack of habitat connectivity. • Lack of foraging resources (seeds, shoots, invertebrates).	Common Planigale, Eastern Chestnut Mouse Grass Owl Three-Toed Snake-Toothed Skink
Leaf Litter	Poorly developed/absent: • Lack of cover. • Lack of foraging resources (fungi, invertebrates).	Long Nosed Potoroo Brushtailed Phascogale Common Planigale Three-Toed Snake-Toothed Skink
Flowering Eucalypts	Limited occurrence/diversity: • Seasonal shortages in nectar flows.	Grey-Headed Flying-Fox Black Flying Fox Eastern Blossom Bat Squirrel Glider Yellow-Bellied Glider
Aquatic	No creeks, lakes, or similar habitat. Former dam offers very limited potential: • Very ephemeral area of habitat. Lack of sufficient aquatic vegetation for cover, prey habitat, etc. • Prone to drying out before breeding cycle completed. • Insufficient area or ability to provide sufficient prey or breeding habitat for waterfowl.	Green-Thighed Frog Green and Golden Bell Frog, Wallum Froglet, Wallum Sedge Frog, *Mixophyes* frogs, Southern Myotis, Waterfowl (eg Bitterns, Jabiru) Other frogs.
Fruiting Species	Absent • No forage for dependant species.	Wompoo Fruit Dove Rose-Crowned Fruit-Dove Barred Cuckoo-Shrike Grey-Headed Flying-Fox Black Flying Fox
Caves, Cliffs, Overhangs	Absent: • Absence of key diurnal, nesting, torpor or colonial roost sites.	Osprey Sooty Owl Eastern Cave Bat, Little and Common Bent Wing Bats etc
Allocasuarina species	Present but only in limited abundance in the forest	Glossy Black Cockatoo
Logs and Stumps	Absent on the site. Stumps and sizeable logs are rare in the 7(a) zone, and have no hollows. Some potential to support prey species.	Spotted Tail Quoll Brushtailed Phascogale Common Planigale Three-Toed Snake-Toothed Skink
Rocky Outcrops	Some exposed bedrock but lack significant cracks, etc which are not filled with earth. No large slabs of exfoliated rocks. Constructed rock wall around tanks offers some limited cracks - limited refugia for reptiles and mammals.	Stephens Banded Snake Pale Headed Snake Common Planigale
Small Terrestrial Prey	Not detected (see Elliot A results), or detected in low abundance and diversity ie Grass Skinks.	forest owls Stephens Banded Snake Pale Headed Snake Spotted Tail Quoll Brushtailed Phascogale

Appendix 1 assesses the potential for locally and regionally recorded threatened species to potentially occur on the study site due to these constraints.

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3.3.3 Potential Habitat for Common Species

The site was found to contain some suitable habitat for a range of common species but was subject to limitations as detailed in the table below.

Table 4: Habitat for commonly occurring species

SPECIES	HABITAT POTENTIAL	SPECIES	LIKELY ABUNDANCE
Terrestrial Species (ie rodents, common dasyurids)	Overall habitat for these species is limited or absent	Bush Rats, Black Rats, Brown Antechinus, Common Dunnart, House Mouse, etc.	Low
Arboreal fauna	Site offers some hollows, sap and nectar resources, rough barked species which may house invertebrates etc.	Sugar Glider, Possums	Fair to very good
Reptiles	Minimal – lack of any refugia	Lace Monitor, Red-Bellied Black Snake etc.	Very low to absent
Aquatic	Very limited in former dam, only present after rainfall	Common Eastern Froglet, Red Backed Toadlet etc	Low to absent

Overall, the site is unlikely to support a high abundance/diversity of common species which therefore limits the potential for threatened raptors (eg forest owls) and other predators to regularly forage on site.

3.4 KEY THREATENING PROCESSES

The following NSW TSCA 1995 Key Threatening Processes operate in the locality and to some extent in the study area, or have potential to occur. In total, these may be a significant determinant on the potential occurrence of threatened species:

1. **Predation by the European Red Fox (*Vulpes vulpes*) and Feral Cat**: Foxes and feral cats are known occurrences in the locality and are a likely occurrence on site given the extent of local habitat modification which the fox prefers (Campbell 1997), and adjacent residential development to the west. These species compete with and prey on native fauna (NSWSC 2000a, 2000b).

2. **Clearing of Native Vegetation**: Clearing for agricultural and urban development has extensively modified the vegetation in the general area. Previous clearing/thinning, logging and underscrubbing have occurred on and adjacent to the site and in most areas have significantly modified vegetation. Clearing, logging, development and agriculture have also had a significant impact on the general area (personal observations).

3. **Predation by the Plague Minnow (*Gambusia holbrooki*):** This species has been recorded preying upon the eggs and tadpoles of both common frog species and the threatened Green and Golden Bell Frog (*Litoria aurea*), and has also been linked to the decline of the New England Bell Frog (*L. castanea*), Southern Bell Frog (*L. raniformis)* and the Southern Tablelands Bell Frog (*Litoria spp*). Breeding of *L. aurea* is now almost restricted to water entities where the Plague Minnow is absent (NSWSC 1999). This pest was not found in the remaining water of the dam.

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4. **Invasion of native plant communities by exotic perennial grasses**: A number of exotic perennial grasses including invade native plant communities and compete or displace many native species eg *Cenchrus ciliaris* (Buffel Grass) *Eragrostis curvula* (African Lovegrass), *Nassella trichotoma* (Serrated Tussock), *Phalaris aquatica* (Phalaris), *Andropogon virginicus* (Whisky Grass), *Chloris gayana* (Rhodes Grass), *Cortaderia* spp. (Pampas Grasses), *Ehrharta erecta* (Panic Veldgrass), *Melinis minutiflora* (Molasses Grass), *Panicum repens* (Torpedo Grass), *Paspalum urvillei* (Vasey Grass), *Pennisetum clandestinum* (Kikuyu), *Setaria sphacelata* (South African Pigeon Grass), *Sporobolus fertilis* (Giant Parramatta Grass), *etc* (NSWSC 2006b). A couple of these grasses (eg Whiskey Grass) occur on and/or adjacent to the site, mostly in pasture.

5. **Infection of frogs by amphibian chytrid causing the disease chytridiomycosis**: This disease may occur in the locality, affecting the distribution and abundance of local frog populations (NSWSC 2002b).

6. **Competition from feral honeybees**: Feral bees compete with native fauna for hollows and pollen/nectar resources (NSWSC 2004k). No hives were noted on site.

7. **High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition:** As mentioned previously, the site does not appear to have been subject to a frequent fire regime. An ecologically unsuitable fire regime may have significant long term impacts resulting in the disruption of life cycle processes in plants and animals and decline in the floristic and structural diversity of vegetation. (NSWSC 2000c). Introduction of a more frequent fire regime on the site could have an adverse affect on the local biodiversity eg via attrition of fire sensitive species, impairing ecological processes, etc.

8. **Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations:** This species may potentially occur in the locality and affect populations of psittacine species (NSWSC 2003c).

9. **Competition and grazing by the feral European rabbit:** Rabbits were not observed on the site hence if present are of low significance in terms of impacts, and may provide prey for native species (NSWSC 2002f).

10. **Human-induced climate change**: This global process is occurring in the area from a variety of sources ie industrial, residential and agricultural (NSWSC 2000d).

11. **Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands**: This process has occurred widely in the LGA as part of flood mitigation and pasture improvement practices (NSWSC 2002e), but is not relevant to the site.

12. **Invasion and establishment of exotic vines and scramblers**: Exotic vines and scramblers may transform habitats by their tendency to: smother existing vegetation, suppress native flora, alter the fire regime, restrict fauna movement, alter rates of litter decomposition and compete for nutrients and water. Listed species present in the mid-north coast include: *Anredera cordifolia, Araujia sericifera, Asparagus sp., Cardiospermum grandiflorum,*

Ipomoea sp., *Macfadyena unguis-cati*, and *Passiflora sp* (NSWSC 2006b). None of these vines were noted on site hence are not a threat.

13. **Invasion of native plant communities by *Lantana camara***: Lantana invades disturbed sites and communities. It suppresses less competitive native vegetation by shading, nutrient removal, smothering and allelopathy. It has been identified as a threat to a number of threatened species and EECs (NSWSC 2006a). As mentioned previously, the present occurrence of Lantana on the property is limited and could be readily eliminated.

14. **Invasion of plant communities by Bitou Bush (*Chrysanthemoides monilifera*)**: Bitou Bush was observed in low abundance on site. At this stage it is not a threat.

15. **Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments**: This process is highly likely to occur in the locality, impacting on fish and marine mammals and reptiles (NSWSC 2004l).

16. **Removal of dead wood, dead trees and logs**: This includes processes such as firewood collection, removal of forest/woodland logging wastes, on-site burning, mulching and "cleaning up" activities. This process threatens a range of hollow obligate species of invertebrates, microbial species and vertebrates, including the following Threatened species: Regent Honeyeater, Pale Headed Snake, Stephens's Banded Snake, Red-Tailed Black Cockatoo, Glossy Black Cockatoo, Barking Owl, Powerful Owl, Masked Owl, Hoary Bat, Spotted-Tail Quoll, Yellow-Bellied Glider, Squirrel Glider and Brush-Tailed Phascogale (NSWSC 2004h). Firewood collecting does not appear to occur, however previous "cleaning up" of the agricultural woodland is likely to have led to loss of wood on the ground.

17. **Invasion and establishment of the Cane Toad**: The species has not been recorded in the locality. However, it has been recorded to the south in Port Macquarie and to the north at Coffs Harbour. Cane Toads prey on native fauna and compete with native carnivores. They are toxic to some predators such as Quolls. Their tadpoles can dominate water bodies (NSWSC 2006c).

18. **Loss of hollow-bearing trees**: As demonstrated by the pattern of vegetation over the site/property, this process is likely to have occurred on site and in the wider area from a number of disturbances including clearing for agricultural and residential development, logging, etc (NSWSC 2007a).

3.5 WILDLIFE CORRIDORS AND KEY HABITATS

Habitat links are evaluated in this report as links from habitat on-site directly to similar habitat on adjacent land. These would be used by fauna which depend solely or at least partially on the site for all of their lifecycle requirements, and/or dispersal. Wildlife corridors are the collection of habitat links and interconnected areas of habitat over a broader landscape that facilitates genetic flow and seasonal movements. Regional corridors are evaluated as per Scotts (2002) definitions and the mapping by the DECC.

Refer to the aerial photo in figure 4. This photo is considered to represent the current state of vegetation on the site.

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