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An Assessment of the Conservation Value of the TNT Warehouse and Distribution Facility Site on Lot 201 in DP 113 3028, Lockwood Road, Erskine Park.

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1. INTRODUCTION

The purpose of this report is to provide a preliminary assessment of the conservation value of the TNT Warehouse and Distribution Facility Site ("the subject site") on Lot 201 in DP 113 3028, Lockwood Road, Erskine Park (Figure 1).

In doing so, the report assesses if potential habitat for threatened species or populations, migratory species or endangered ecological communities, occurs on the subject site and if a more comprehensive assessment of impacts on threatened and migratory biota is required in relation to development of the site.

2. THE SUBJECT SITE

The subject site is currently vacant land that has been cleared, levelled and benched consistent with previous approvals for development and subdivision. The site lies within Erskine Park Industrial Estate, which is part of the Western Sydney Employment Zone, and is fully serviced.

The vegetation on the subject site consists of exotic grasses, with a scarce occurrence of exotic sedges and other weeds (Plate 1). A farm dam occurs in the north-western corner of the subject site (Plate 2). Cumbungi (*Typha orientalis*) and sedges (e.g. *Juncus usitatus*) occur near the banks of the dam.

3. THE PROPOSED DEVELOPMENT

The TNT Warehouse and Distribution Facility ("the proposed development") is proposed for construction and operation on the subject site. The proposed development includes a large warehouse (truck terminal), office buildings, car and trailer parking areas, truck wash shed, access road and supporting infrastructure (Figure 2).

4. SITE INSPECTION

An initial fauna survey was conducted on the subject site on 27 July 2013. This involved walking slowly over the entire subject site and recording what fauna species were encountered opportunistically. Fauna were identified by sight with the assistance of binoculars (Swarovski 8 x 30 mm) and/or from their calls.

Frog and bat calls were recorded at the dam on two successive nights (1 & 2 August 2013) with a Song Meter 2MBAT+ (Wildlife Acoustics Inc.) that was located on the dam's bank, about one meter above ground level. The Song Meter is sound activated and it was programmed to record sounds (including frog calls) between 1800 & 2000 hrs, 2300 & 0100 and 0300 & 0500 hrs each recording night. Digital sound recordings were downloaded onto a laptop when the Song Meter was collected from the subject site at 0930 hrs on 3 August 2013. No bats were detected, but frog species present on the subject site were identified from the recordings of calls made by the Song Meter.

5. FAUNA SPECIES

Fauna species recorded on the subject site during the fauna survey are shown in Table 1. The biodiversity of the subject site is poor and the fauna species recorded are common in

the Sydney metropolitan area and have a widespread distribution throughout south-eastern Australia.

Table 1 Fauna Species Recorded on Subject Site, 27 July 2013

Family	Common Name	Scientific Name
Myobatrachidae	Common Eastern Froglet	*Crinia signifera*
Myobatrachidae	Spotted Marsh Frog	*Limnodynastes tasmaniensis*
Anatidae	Australian Wood Duck	*Chenonetta jubata*
Psittacidae	Red-rumped Parrot	*Psephotus haematonotus*
Meliphagidae	Red Wattlebird	*Anthochaera carunculata*
Meliphagidae	Noisy Miner	*Manorina melanocephala*
Dicruridae	Magpie-lark	*Grallina cyanoleuca*
Artamidae	Australian Magpie	*Cracticus (Gymnorhina) tibicen*
Corvidae	Australian Raven	*Corvus coronoides*
Sturnidae	Common Mynah	*Acridotheres tristis*

6. THREATENED ECOLOGICAL COMMUNITIES

Endangered or Critically Endangered Ecological Communities that are listed under the schedules of the NSW *Threatened Species Conservation Act, 1995* (TSC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act), and which occur in the Penrith LGA are:

- Shale Sandstone Transition Forest
- Cumberland Plain Woodland
- Sydney Coastal River-flat Forest
- Sydney Turpentine Ironbark Margin Forest
- Freshwater Wetlands
- Elderslie Banksia Scrub Forest
- Shale/Gravel Transition Forest
- Blue Gum High Forest.

The original vegetation community on the subject site was probably Cumberland Plain Woodland. However, this community no longer occurs on the subject site as a result of past clearing and past and present land-uses. There are no signs that this or other threatened vegetation communities are regenerating on the subject site.

7. THREATENED FLORA

Threatened plant species that have been recorded in the locality (5 km radius of the subject site) include:

- *Marsdenia viridiflora* subsp. *viridiflora;*
- *Allocasuarina glareicola*;
- *Dillwynia tenuifolia*;
- Bynoe's Wattle (*Acacia bynoeana*);
- Camden White Gum (*Eucalyptus benthamii*);
- *Micromyrtus minutiflora*;
- Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*);
- Small-flower Grevillea (*Grevillea parviflora* subsp. *parviflora*);

- Hairy Geebung (*Persoonia hirsuta*);
- Nodding Geebung (*Persoonia nutans*);
- *Pimelea curviflora* var. *curviflora*; and
- Spiked Rice-flower (*Pimelea spicata*).

None of these species occur on the subject site as a result of the past history of vegetation clearance and the domination of the site by exotic grasses, sedges and herbs.

The following endangered flora population has been recorded in the locality:

- *Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas.

This population does not occur on the subject site.

8. THREATENED TERRESTRIAL FAUNA

- Green & Golden Bell Frog (*Litoria aurea*);
- Black-necked Stork (*Ephippiorhynchus asiaticus*);
- Australasian Bittern (*Botaurus poiciloptilus*);
- Black Bittern (*Ixobrychos flavicollis*);
- Spotted Harrier (*Circus assimilis*);
- Little Eagle (*Hieraaetus morphnoides*);
- Square-tailed Kite (*Lophoictinia isura*);
- Bush Stone-curlew (*Burhinus grallarius*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Little Lorikeet (*Glossopsitta pusilla*);
- Swift Parrot (*Lathamus discolor*);
- Barking Owl (*Ninox connivens*);
- Powerful Owl (*Ninox strenua*);
- Masked Owl (*Tyto novaehollandiae*);
- Sooty Owl (*Tyto tenebricosa*);
- Speckled Warbler (*Chthonicola sagittata*);
- Regent Honeyeater (*Anthochaera phrygia*);
- Painted Honeyeater (*Grantiella picta*);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*);
- Scarlet Robin (*Petroica boodang*);
- Flame Robin (*Petroica phoenicea*);
- Diamond Firetail (*Stagonopleura guttata*);
- Spotted-tailed Quoll (*Dasyurus maculatus*);
- Koala (*Phascolarctos cinereus*);
- Yellow-bellied Glider (*Petaurus australis*);
- Squirrel Glider (*Petaurus norfolcensis*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Little Bentwing-bat (*Miniopterus australis*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);

- Southern Myotis (*Myotis macropus*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Cumberland Plain Land Snail (*Meridolum corneovirens*).

The dam provides potential habitat for the Green and Golden Bell Frog. This species inhabits marshes, dams and stream sides, particularly those containing bulrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water bodies which are unshaded, free of the predatory fish *Gambusia holbrooki,* have a grassy area nearby and diurnal sheltering sites such as vegetation and/or rocks. Some sites, particularly in the Greater Sydney region, are in highly disturbed areas such as disused industrial sites, brick pits, landfill areas and cleared land.

There are five records in the NSW Wildlife Atlas of the Green and Golden Bell Frog occurring in the locality (www.bionet.nsw.gov.au). The nearest record is from a location about 6 km north of the subject site, on the Ropes Creek floodplain.

The Southern Myotis is a threatened bat species that forages over open water for small fish, prawns and aquatic insects such as water boatmen, water striders, backswimmers and whirligig beetles. These prey items live just below the water surface and the bats catch them by trawling. Therefore, the Southern Myotis may potentially forage for aquatic insects in or above the dam on the subject site.

There are 16 records in the NSW Wildlife Atlas of the Southern Myotis occurring in the locality (www.bionet.nsw.gov.au). The nearest records are from locations that are within one kilometer of the subject site.

The Green and Golden Bell Frog and Southern Myotis were not detected on the subject site in the present study, despite targeted surveys for them. However, surveys were conducted in winter when both species are normally experience varying periods of aestivation (Green and Golden Bell Frog) or hibernation (Southern Myotis). Seven-part tests of Significance, triggered under the NSW Environmental Planning & Assessment Act, 1979 (EP & A Act) (Appendix A), conclude that the proposed development would not significantly impact on the status of these two species or their habitats, at a local or broader geographical level.

The other threatened fauna species that have been recorded in the locality species are associated with woodland and forest habitats, which do not occur on or adjacent to the subject site.

No threatened fauna populations have been recorded in the locality.

9. LISTED MIGRATORY SPECIES (EPBC ACT)

Fork-tailed Swifts (*Apus pacificus*) and White-throated Needletails (*Hirundapus caudacutus*) may occasionally fly high over the subject site. These latter species would not be impacted by the proposed development.

10. CONCLUSION

The subject site is located within a landscape which is being transformed from cleared farmland to an industrial estate. It provides either marginal or inappropriate habitat for most native flora and fauna species, including listed threatened and migratory species that have

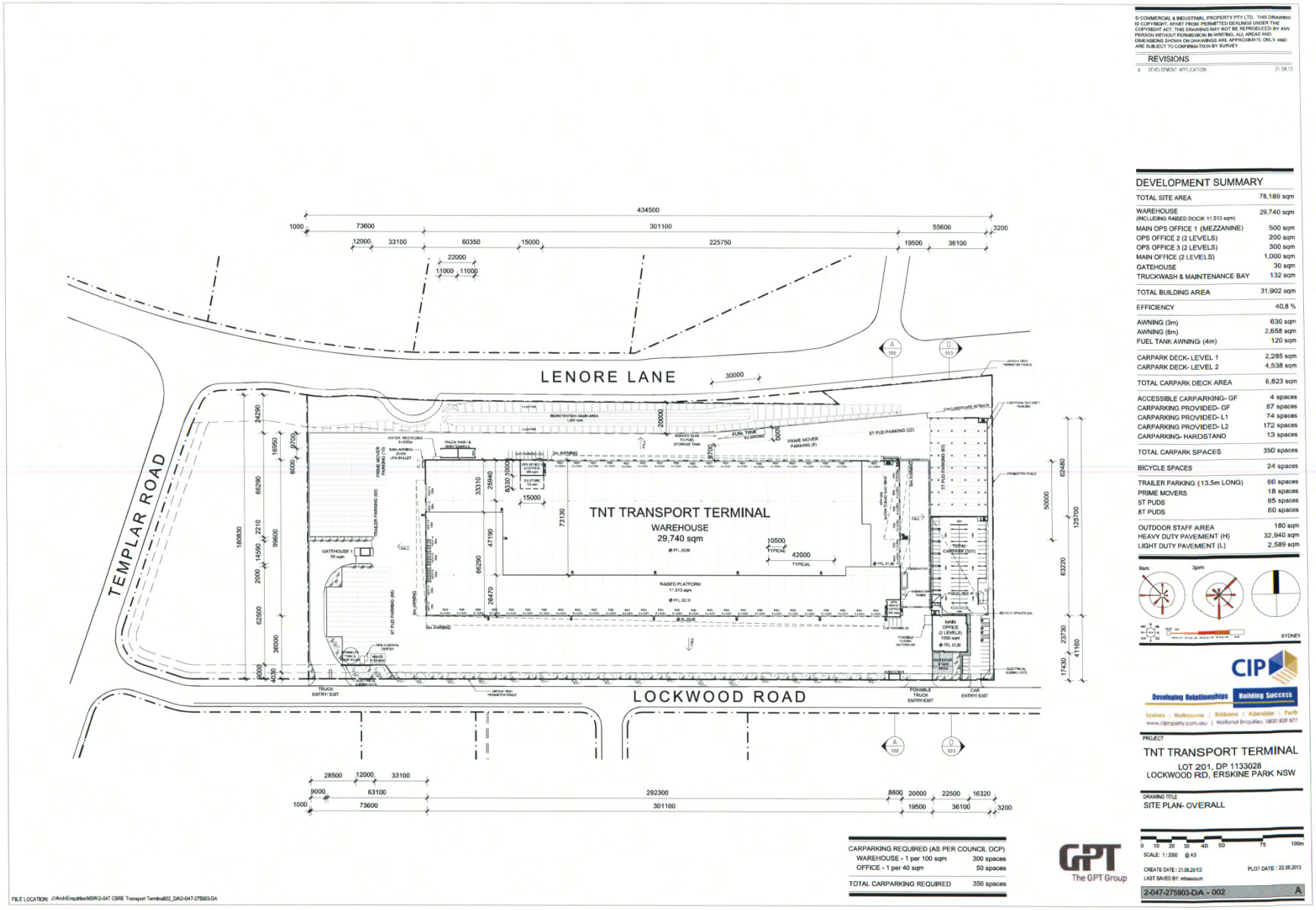
been recorded in the locality. Therefore, the proposed development of the subject site will not significantly impact on the status of native flora and fauna species, or their habitats, at a local or broader geographical scale.

Figure 1 Location of Subject Site (enclosed within orange boundary lines)

Plate 1 **View of subject site from near the western boundary.**

Plate 2 **Dam near the north-western corner of the subject site**

Figure 2 Site Plan



Appendix A

Seven Part Tests of Significance

GREEN AND GOLDEN BELL FROG

1. SPECIES PROFILE

Description

The Green and Golden Bell Frog is a relatively large frog with a stout body form. Adult size ranges from approximately 45 to 100 mm snout to vent length (SVL), with most individuals being in the 60 to 80 mm size class. Males are generally smaller than females (maximum size 70 mm) and when mature, tend to have a yellowish darkening of the throat area. Males also develop nuptial pads on the inner finger and appear as a brown pigmented patch. Mature females are larger bodied (maximum size 90 to 100 mm) (White and Pyke 1996).

The dorsal coloration is quite variable being a vivid pea green splotched with an almost metallic brass brown or gold. The backs of some individuals may be almost entirely green while in others the golden brown markings may almost cover the dorsum. When the frogs are inactive coloration can darken to almost black. A glandular creamish white stripe extends from behind the eye almost to the groin. The lower margin of this dorso-lateral stripe is black or dark brown, the upper margin is edged gold.

The belly is usually an immaculate granular creamish white. The lateral margins of the body are adorned with raised glandular creamish spots of irregular size. Legs are a variegated green and gold with the groin area and inside leg a brilliant electric blue. The fingers and toes have expanded terminal pads but are rarely wider than the toe/finger itself. The toes are heavily webbed. The eye has a horizontal elliptical pupil and a golden yellow iris. Juveniles are similar to adults and metamorphose at 25 to 30 mm SVL.

Tadpoles are relatively large, reaching 65 to 80 mm. They are deep bodied and possess long tails with a high fin that extend almost to mid-body. They swim actively and evade capture. As tadpoles become larger, the golden dorso-lateral stripe and a green tinge to the back can be observed just before the limb growth commences (White 1995).

Distribution

The Green and Golden Bell Frog was formerly distributed from the NSW north coast near Brunswick Heads southwards along the NSW coast to Victoria where it extends into Queensland (White & Pyke 1996; Gillespie 1996), west to Bathurst, Tumut and the ACT (Moore 1961, Osborne *et al.* 1996). There are records from the NSW tableland areas such as Armidale/Ulong (New England Tableland) and Canberra, Cobargo and Jindabyne (Monaro Tableland).

In the 1960s the species was considered widespread, abundant and commonly encountered. Declines were noticed in the 1970s and became severe in the 1980s such that today the species exists as a series of isolated populations within its former known range. Since 1990 there have been approximately 50 locations in NSW where the species is confirmed to still exist (only 11 in conservation reserves). There are six populations of substantial size (numbers over 300); two are located in the Sydney metropolitan area, two in the Shoalhaven area, and two on the mid north coast (White and Pyke 1996).

Habitat

The habitat preference and requirements of the Green and Golden Bell Frog is not well understood and the species has, on occasions, turned up in the most unlikely locations. It inhabits marshes, dams and stream sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water bodies which are unshaded, free of the predatory fish *Gambusia holbrooki,* have a grassy area nearby and diurnal sheltering sites such as vegetation and/or rocks (White and Pyke 1996). Some sites, particularly in the Greater Sydney region, are in highly disturbed areas such as disused industrial sites, brick pits, landfill areas and cleared land.

Refuge habitat is least well understood, but is required by the species during periods of metabolic quiescence, particularly during cooler parts of the year ("over-wintering habitat") and at other times when not diurnally active or seeking shelter from adverse conditions or predators. Types of refuge habitats that have been identified include dense tussock-forming vegetation (Hamer 1998; Patmore 2001), deep fissures in mud (M. Christy, cited by Patmore 2001), among rocks (White & Pyke 1996; Hamer 1998), within rotting logs or under embedded logs and timber piles (Pyke & White 2001) and other human refuse, e.g. sheet iron, fibro, bricks, etc. (Pyke & White 2001).

Reproduction

The Green and Golden Bell Frog is frequently active by day and usually breeds in summer when conditions are warm and wet (Cogger 2000). Males call while floating in water and females produce a raft of eggs which initially float before settling to the bottom, often among the vegetation (Harrison 1922). Tadpoles take approximately six weeks to develop, though this varies considerably and is dependent on temperature and other conditions (Pyke and White 1996). Tadpoles feed on algae and other vegetative matter while adults are voracious insectivores and will also readily eat other frogs and juveniles of their own species. They are preyed upon by snakes and various wading birds, and are presumably fed on as larvae by eels, other fish and tortoises.

Predator/Prey Relationships

Adult Green and Golden Bell Frogs are known to feed on a range of aquatic and terrestrial invertebrates (e.g. insect larvae), crickets, cockroaches, dragonflies, earthworms, flies, grasshoppers, mosquito wrigglers, isopods, freshwater crayfish and slugs) and frogs (especially tadpoles).

Tadpoles predominantly graze on algal, bacterial scum or other vegetative matter growing on submerged rocks or other substrata. Occasionally, they may scavenge or become carnivorous on other aquatic organisms.

They are preyed upon by snakes, various wading birds, large invertebrates (e.g. water beetles, water scorpions), occasionally by raptors, and are presumably fed on as larvae by eels, other fish (e.g. Plague Minnow) and tortoises.

Threats to the Status of the Green and Golden Bell Frog

- Habitat loss, modification and disturbance (including the Key Threatening Processes "clearing of native vegetation" and "alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands").
- Fragmentation and isolation of habitat.
- Road mortality where populations are already small due to other threats (Daly 1996).
- Predation by exotic fish, particularly the Plague Minnow *Gambusia holbrooki* (a Key Threatening Process).
- Infection of frogs by amphibian chytrid fungus that causes the disease chytridiomycosis (a Key Threatening Process).
- Water pollution.
- Predation by feral animals such as foxes and cats (a Key Threatening Process).

Local Occurrence

The Green and Golden Bell Frog is known or predicted to occur in the following sub-regions of the Sydney Metro Catchment Management Region.

CMA sub-region	Known or predicted	Geographic restrictions within region
Cumberland	Known	None
Pittwater (Part A)	Known	None
Pittwater (Part B)	Known	None
Sydney Cataract	Known	None

Important habitat requirements within locality

Habitat	Details
Breeding Habitat	Still or slow flowing natural waterbodies with some aquatic emergent vegetation such as Typha, Phagmites or Eleocharis. Will use artificial waterbodies and non-native emergent vegetation.
Foraging Habitat	Amongst emergent aquatic or riparian vegetation and amongst vegetation, fallen timber adjacent to and within 500m of breeding habitat, including grassland, cropland and modified pastures.
Time of year species identifiable (if flora) or best detected (if fauna)	August to March; during or immediately following substantial rain in this period;

2. SEVEN-PART TEST

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

The Erskine Park Industrial Estate is located on the edge of the ranges of two recognised Key Populations of Green and Golden Bell Frogs within the Sydney metropolitan area, the St Marys Population to the north, and the Hammondville Population to the south-east.

The St Marys population consists of a number of sub-populations that are somewhat transient in the reliability with which their population can be detected at a given site. The included sub-populations may possibly be operating as a metapopulation and are located on RailCorp lands, Transgrid lands, Sydney Water lands and private lands at St Marys, Mt Druitt, Prospect and Riverstone. The distance between some of these sites and the barriers to connectivity may mean that some are operating as isolated entities.

The Hammondville Population is known to occur in wetlands associated with the lower Georges River Floodplain.

There are five records from the last 25 years of Green and Golden Bell Frogs occurring within the locality (10 km radius of the subject site). The closest record is from a location approximately 6 km north of the subject site and probably is of individuals belonging to the St Marys Population. The sizes of the St Marys and Hammondville Populations are not known.

No Green and Golden Bell Frogs were recorded in or around the dam on the subject site, despite targeted surveys for them. This species is capable of moving up to 1-1.5 km in a single night (Pyke & White 2001; A. White, cited by DECC 2007) and tagged individuals have moved up to 3 km over longer periods of time (Pyke & White 2001). Some individuals have been recorded several kilometres from the nearest breeding habitat (Gillespie 1996; Pyke & White 2001) or demonstrated significant movements within a presumed home range (Murphy 1996; Hamer 1998; Patmore 2001 & Daly 2001).

The subject site is on the floodplain of Ropes Creek. Although Green and Golden Bell Frogs are likely to move along Ropes Creek and its riparian corridor, the subject site is 6 km away from the nearest known sub-population. Individuals from this population are unlikely to disperse to the subject site because it is at least twice the known maximum distance that individuals are known to disperse.

Therefore, the proposed development of the subject site is not likely to have an adverse effect on the life cycle of the Green and Golden Bell Frog such that a viable local population of this species is likely to be placed at risk of extinction**.**

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

Not applicable. There are no listed endangered populations of the Green and Golden Bell Frog in the locality.

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

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(i) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable. The Green and Golden Bell Frog is not an endangered ecological community.

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

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

(i) The proposed development will result in the removal of a small dam in the north-western corner of the subject site, which is potential foraging and breeding habitat for the Green and Golden Bell Frog.

(ii) The subject site is on the floodplain of Ropes Creek. Green and Golden Bell Frogs are likely to move along Ropes Creek and its riparian corridor. This corridor will not be fragmented or become isolated as a result of the proposed development.

(iii) No Green and Golden Bell Frogs were detected in the study area, and the potential habitat is considered extremely marginal because of the distance of the dam from known populations of Green and Golden Bell Frogs.

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

No critical habitat for the Green and Golden Bell Frog occurs in the locality.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

Priority actions proposed by OEH for the recovery of the Green and Golden Bell Frog in NSW are to:

- increase the security of key Green and Golden Bell Frog (GGBF) populations by way of preventing further loss of GGBF habitat at key populations across the species' range and where possible secure opportunities for increasing protection of habitat areas;

- ensure extant GGBF populations are managed to eliminate or attenuate the operation of factors that are known or discovered to be detrimentally affecting the species;

- implement habitat management initiatives that are informed by data obtained through investigations into the general biology and ecology of the GGBF through a systematic and coordinated monitoring program;

- establish, within more than one institution, self-sustaining and representative captive populations (particularly 'at risk' populations) of the GGBF for the primary purpose of maintaining 'insurance' colonies for re-establishment and supplementation of populations of the species; and

- increase the level of regional and local awareness of the conservation status of the GGBF and provide greater opportunity for community involvement in the implementation of the recovery plan.

The proposed development is in compliance with these priority actions.

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

Threats to the status of the Green and Golden Bell Frog include:

- Predation by the introduced Plague Minnow or Mosquito Fish (*Gambusia holbrooki*).
- Alteration to the natural flow regimes of rivers and streams and their floodplains and their wetlands.
- Infection of frogs by amphibian chytrid fungus that causes the disease chytridiomycosis.
- Clearing of native vegetation (destruction of habitat, fragmentation of vegetation and degradation of riparian zone vegetation).
- Predation by the European Red Fox (*Vulpes vulpes*).

"Clearing of native vegetation" is the only potential threatening process that would occur in the subject area as a result of the proposed development. However, no Green and Golden Bell Frogs have been detected on or near the subject site and the habitat there is considered to be marginal. Therefore, the clearance or modification of potential habitat on the subject site is unlikely to impact on the local or broader geographical status of the Green and Golden Bell Frogs or its habitats.

3. CONCLUSION

The proposed development is unlikely to significantly impact on the status of the Green and Golden Bell Frog or its habitats. Therefore, a Species Impact Statement is not required.

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SOUTHERN MYOTIS

1. SPECIES PROFILE

Description

This species is now most often referred to as *Myotis macropus* or the Southern Myotis, but has previously been called the Large-footed Myotis (*M. adversus*). It has disproportionately large feet; more than 8 mm long, with widely-spaced toes which are distinctly hairy and with long, curved claws. It has dark-grey to reddish brown fur above and is paler below. It weighs up to 15 grams and has a wingspan of about 28 cm.

Past Range and Abundance

Unknown. Taxonomic revision and confusion makes definitive statements about this species extremely difficult. However, in light of taxonomic revision by Kitchener et al. (1995) and recent genetic studies (T. Reardon unpub.) the species is thought to have occurred from the south of south-east Queensland along coastal Australia, with populations in Victoria and eastern South Australia and along the inland waterways of Murray and possibly Darling River systems. Thus the distribution of this species is much more restricted than shown earlier for the *M. adversus* complex (see McKean and Hall 1965, Strahan 1983, 1995) but consistent with that shown by Parnaby (1992). There is no historical data on abundance.

Present Range and Abundance

This species is generally uncommon to rare throughout most of its range. It occurs disjunctly along the coast from Victoria to south east Queensland and inland along waterways (for general distribution see Parnaby 1992). There has possibly been a decline along inland waterways (Law and Anderson unpub.), especially in southern New South Wales. In Victoria this species has been recorded from a relatively small number of localities scattered across lowland areas of the state, associated with large inland rivers (e.g. Murray River), coastal rivers and estuaries (e.g. Glenelg River, Wingan Inlet), lakes (e.g. Gippsland Lakes) and small creeks. Although widespread it is considered to be relatively rare and is only patchily distributed within areas of apparently suitable habitat (Lumsden and Menkhorst 1995). In South Australia it is known only from small colonies near Nildottie on the River Murray but probably extends along the river where there are cliffs. In south east Queensland, where in some areas it is locally common, the range of this species extends north to Gladstone.

Preferred habitat is riparian. Roosts in caves, mines, tree hollows, aqueduct tunnels and under bridges and in dense vegetation in the vicinity of bodies of slow-flowing or still water (including estuaries). A recent study of the roosting ecology of this species at three localities in Victoria found it roosted exclusively in tree hollows (Caddle 1998). Roosts were located in partly submerged dead trees at Lake Eildon, while live trees close to the water were used at the other two localities. In South Australia**,** small colonies have been found in small vertical avens in overhangs in limestone cliffs along the Murray River. Almost exclusively forages over water (rivers, streams, dams) for aquatic prey in a variety of forest types (McKean and Hall 1965, Dwyer 1970, Lumsden and Coles 1989, Jones and Rayner 1991).

Local Occurrence

The Southern Myotis is known or predicted to occur in the following sub-regions of the Sydney Metro Catchment Management Region:

CMA sub-region	Known or predicted	Geographic restrictions within region
Cumberland	Known	None
Pittwater (Part A)	Known	None
Pittwater (Part B)	Known	None
Sydney Cataract	Known	None

Important habitats within locality:

Habitat	Details
Breeding Habitat	Likely to be as per roosting habitat
Foraging Habitat	Over streams or waterbodies
Time of year species identifiable (if flora) or best detected (if fauna)	October to March

Threats

Not certain. Is likely to be susceptible to changes in water quality, which may result from vegetation clearing and logging (sedimentation), sewage and fertilizer run-off (eutrophication), pesticide/herbicide leakage (chemical pollution) and altered flow regimes (changes to river ecology). Where populations concentrate in roosts which are susceptible to disturbance, human activities such as recreational use of caves and removal of old wooden bridges would also be a threat. The species may have been subject of over-collection in the past.

2. SEVEN PART TEST OF SIGNIFICANCE

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

There are 16 records in the NSW Wildlife Atlas of the Southern Myotis occurring in the locality (www.bionet.nsw.gov.au). The nearest records are from locations that are within one kilometer of the subject site

The Southern Myotis may potentially forage for aquatic insects in or above the dam on the subject site. However, the Southern Myotis is a mobile species that is known to move several kilometers in a night in search of food. The dam on the subject site is a negligible

area of potential foraging habitat that is available for Southern Myotis individuals in the locality.

There is no potential roosting habitat for the Southern Myotis on the subject site.

Therefore, it is considered unlikely that the proposed development would adversely affect the life cycle of these species to the extent that it would place viable local populations at risk of extinction.

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

Not applicable. The Southern Myotis is listed as a threatened species rather than as an endangered population.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:
(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable. The Southern Myotis is listed as a threatened species rather than as an endangered or critically endangered ecological community.

(d) In relation to a habitat of a threatened species, population or ecological community:
(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
(ii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

(i) The proposed development will result in the removal of a small dam from the north-western corner of the subject site, which is potential foraging habitat for the Southern Myotis.

(ii) No area of habitat will be fragmented or isolated as a result of the proposed development.

(iii) The area of potential foraging habitat for the Southern Myotis that would be removed from the subject site is a negligible proportion of potential habitat that is available for this species in the locality and broader geographical area. There is no potential roosting or breeding habitat on the subject site.

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

No critical habitat for the Southern Myotis occurs in the locality.

(g) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The priority actions for the protection of microchiropteran bats in NSW are:

1. Develop and promote State-wide bat awareness programs for schools, CMAs, landholders and industry groups etc.

2. Raise awareness of the effects of pesticides.

3. Prepare EIA guidelines which address the retention of hollow bearing trees maintaining diversity of age groups, species diversity, structural diversity. Give priority to largest hollow bearing trees.

4. Ensure largest hollow bearing trees, inc. dead trees and paddock trees are given highest priority for retention in PVP assessments (offsets should include remnants in high productivity) and/or other land assessment tools.

5. Ensure the Code of Practice for private native forestry includes adequate measures to protect large, hollow-bearing trees and viable numbers of recruit trees.

6. Promote the conservation of these HCV private land areas using measures such as incentive funding to landholders, off-setting and biobanking, acquisition for reserve establishment or other means.

7. Identify the effects of fragmentation on the species in a range of fragmented landscapes, such as cleared coastal river valleys. For example movement and persistence across a range of fragment sizes.

8. Investigate the effectiveness of logging prescriptions.

9. Research the degree of long-term fidelity to roost trees and roosting areas in order to assess their importance and the effects of their removal.

10. Research the roosting ecology of tree-roosting bats, e.g. identifying the attributes of key roosts.

11. Study the ecology, habitat requirements and susceptibility to logging and other forestry practices of this little-known species

12. Identify important foraging range and key habitat components for this species.

13. Research the effect of different burning regimes.

14. Research the effectiveness of rehabilitation measures intended to increase bat populations in degraded landscapes, such as revegetating riparian zones.

15. Study the susceptibility of this species to pesticide accumulation.

16. Undertake long-term monitoring of populations cross tenure in conjunction with other bat species to document changes.

17. Quantify any benefits of local bat populations to reducing the impact of insect pests on commercial crops.

18. Identify areas of private land that contain high densities of large, hollow-bearing trees as areas of high conservation value in planning instruments and land management negotiations e.g. LEP, CAPs, PVPs.

19. Undertake a systematic survey of productive coastal river valleys to quantify the importance of private land relative to public lands.

The proposed development is consistent with the priority actions for the recovery of microchiropteran bats in NSW.

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

"Clearance of native vegetation" is a Key Threatening Process that would impact on the status of each bat species. However, removal of the dam and its aquatic vegetation is a negligible amount of habitat that is available in the locality for the Southern Myotis. Therefore, it is unlikely that the proposed development of the subject site would significantly increase the impact of this key threatening process.

3. CONCLUSION

The proposed development is unlikely to significantly impact on the status of the Southern Myotis or its habitats. Therefore, a Species Impact Statement is not required.

4. REFERENCES

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