

FLORA, FAUNA & ECOLOGICAL ASSESSMENT FOR

THE PROPOSED ADVANCED WASTE TREATMENT
FACILITY, ELIZABETH DRIVE, KEMPS CREEK.

PENRITH LOCAL GOVERNMENT AREA

FOR

MAUNSELL AUSTRALIA

FOR

SITA ENVIRONMENTAL SOLUTIONS

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EXECUTIVE SUMMARY

It is proposed that SITA Environmental Solutions develop an advanced waste treatment facility within their property located at Elizabeth Drive at Kemps Creek within the Penrith Local Government Area. A number of ecological issues were investigated especially in relation to threatened species, populations and endangered ecological communities listed under the NSW Threatened Species Conservation Act, 1995 and the Commonwealth's Environmental Protection & Biodiversity Conservation Act, 1999. Key Threatened Species Conservation Act issues include the immediate occurrence on-site of the Cumberland Plain Woodland endangered ecological community and the close proximity of the Sydney Coastal River Flat Forest endangered ecological community. The recording of the Cumberland Plain Land Snail by the consultant within the adjacent riparian community habitat and the presence of broad habitat of *Acacia pubescens* on-site. An Eight Part Test of Significance has been applied to the Cumberland Plain Woodland and relevant threatened species. It is concluded that the proposed SITA facility will not have a significant effect on threatened species, populations or endangered ecological communities under the NSW Threatened Species Conservation Act, 1995, Commonwealth's Environment & Biodiversity Conservation Act, 1999 or the NSW Fisheries Management Act, 1994

STATE LICENCING REQUIREMENTS & APPROVALS

The field assessments were undertaken with the following State legislative licences and approval:

- * NSW National Parks & Wildlife Service
Scientific Investigation Licence: A 1810.
- * NSW Agriculture Animal Research Licence: AW98/035.
- * Animal Care & Ethics Committee Approval: DG ACEC 193/98.

GLOSSARY OF TERMS

Anthropogenic waste:	Waste materials eg: dumped bricks, tyres, household rubbish, bottles etc
Arboreal:	Pertaining to trees
Arborescent:	Tree-like in form or appearance.
Aural:	Listening
Bassian:	Fauna of temperate regions of Australian, generally the area from SE. Queensland, eastern NSW, Victoria and SE. South Australia. Excluding the tropical (Torresian) and arid zone (Eyrean) regions of Australia.
Benthic Fauna:	Fauna (usually small invertebrates) living or inhabiting the bottom of a waterway, lake, river, creek etc.
Biota:	The flora and fauna of a given region.
Bioregional:	A regional perspective of plant and animal assemblages.
Critical-weight range fauna:	Medium-size mammals that have been significantly affected by European settlement and associated introduction of carnivorous mammals viz: cat, fox and dog. Many native mammals outside of this 'critical-weight range' have not been affected by these introductions.
Detritivore:	A feeder of detritus from decaying plants and animals (detritus).
Exotic:	An introduced plant or animal not native or indigenous.
FM Act:	Fisheries Management Act, 1994
Indigenous:	A native plant or animal to any given area.

Lek	A temporary male territory for the sole purpose of attracting females.
Mesomorphic (cf: xeromorphic):	Plants that have a high degree of moisture content of the leaves. Rainforest species are generally mesomorphic.
Piscivorous:	Fish-eating.
Raft line:	Snagged or suspended debris in the canopy or foliage of trees after flooding or when water levels raise.
Rhizome:	A horizontal underground stem or root.
Riffle:	A length of waterway where water of shallow depth flows rapidly over stones or river gravel and may produce a small rapid.
Riparian (vegetation):	Vegetation occurring on the banks of a creek, river or stream.
ROTAP:	<u>R</u>are <u>O</u>r <u>T</u>hreatened <u>A</u>ustralian <u>P</u>lants'
Sap-site tree:	An individual tree that is used by several fauna species to extract phloem (sap/kino) from the cambium layer of selected tree species as a food source. The Yellow-bellied Glider is one of the best known examples that extracts sap from selected tree species. Sap-site trees are usually distinguished by characteristic 'V' shaped incisions into the outer bark.
Scientific Committee:	The scientific committee of persons appointed under the NSW Threatened Species Conservation Act, 1995.
Seral:	An underdeveloped stage of a plant community or plant succession.
Sphere-of-influence:	Environmental or biological factors outside of a given study site that influence the biota within a study site.

Stag:	Dead standing tree, frequently containing hollow limbs.
Sympatric:	The ability of animals or plants having similar or near parallel ecological requirements cohabiting with another related or similar species within the same habitat.
Trap-Nights:	The number of traps set per night in a given area. Eg: 20 traps set for one night = 20 trap-nights.
TSC Act:	NSW Threatened Species Conservation Act, 1995.
Vegetatively (asexually):	Vegetative reproduction. Non-sexual reproduction.

1.0 INTRODUCTION & BACKGROUND & CADASTURE:

MAUNSELL AUSTRALIA commissioned Environmental Appraisal & Planning Pty Limited to undertake a flora, fauna and Eight Part Test of Significance for the proposed advanced waste treatment facility at Elizabeth Drive, Kemps Creek within the Penrith Local Government Area for SITA Environmental Solutions.

The area directly affected by the proposal will be referred hereafter as the 'subject site'. Where the term 'study area' is utilised, then this will refer to the broader area of Kemps Creek and environs. The subject site is a triangular area in configuration and is situated on the eastern side of the Badgerys Creek. There is a chain wire cyclone mesh fence located along the northern and western boundaries of the subject site. The subject site is a modified form of the Cumberland Plain Woodland endangered ecological community. South Creek is located approximately 500 metres to the south whereas, the Kemps Creek is situated approximately two kilometres further to the South.

There are no additional infrastructures present within the subject site. However, a large open dam is located on the periphery of the subject site. The subject site is situated within a modified rural environment, however, an existing land fill precinct is extremely modified and disturbed environment utilised entirely for anthropogenic waste purposes. The University of Western Sydney is located along the northern boundary. Most of the subject site is cleared or semi-disturbed. The adjacent Badgerys Creek has been identified as Sydney Coastal River Flat Forest endangered ecological community whereas the subject site is a modified form of Cumberland Plain Woodland endangered ecological community.

There are no designated State Environmental Planning Policy-14 (Coastal Wetlands) present within the immediate locality of the subject site. There are no ephemeral streams present within the subject site although the subject site drains into the Badgerys Creek precinct. The subject site can be found on the Prospect 1: 25000 topographical map (Series 9030-II-N). The grid reference to the approximate centre of the overall subject site is GR: 5923503.

2.0 BIOREGIONAL CONTEXT:

The Penrith LGA's natural environment consists of open forests, closed forests (dry rainforest communities and some swamp sclerophyll forests), woodlands, sedgeland, wetlands and aquatic habitats. There are no nature conservation reserves adjacent to or in close proximity to the subject site. Broader district conservation areas include the Kemps Creek Nature Reserve, Western Sydney regional Park, Leacock Regional Park, Parramatta Regional Park, William Howe Regional Park, Bents Basin State Recreation Area and the Castlereagh Nature Reserve. The above conservation reserves are administered by the Department of Environment & Conservation's National Parks & Wildlife Service division.

Botanically, the subject site (and the broader study area) are located within the Central Coast Botanical Subdivision of New South Wales (Harden, 1992). This botanical subdivision contains an extremely rich biodiversity of flora and fauna in NSW and is representative by a vast variety of habitats and is represented by a high degree of threatened species of both flora and fauna and endangered ecological communities that are poorly represented in the current localised or regional national park estate (for example the threatened plants *Dillwynia tenuifolia*, *Acacia pubescens* and *Persoonia nutans* and the Sydney Coastal River Flat Forest endangered ecological community).

The faunal assemblages are typically Bassian, with the occasional Torresian faunal assemblage occurring during summer months when visitation by tropical migratory avifauna occurs usually between the months of October to March. Most of the localised flora and faunal studies remain as unpublished reports for specific Development Applications, however, there are several flora and faunal reports that pertain to the broader area of the Penrith LGA and environs. The most extensive vegetation studies pertain to the vegetation surveys by Benson (1992) and Benson and Howell (1994) respectively.

STATE LEGISLATIVE REQUIREMENTS:

The NSW Threatened Species Conservation Act, 1995 is administered by the NSW National Parks & Wildlife Service. The ecological flora and fauna habitat assessment considered legislative aspects of the Threatened Species Conservation Act (TSC Act), 1995, Section 5A of the Environmental Planning & Assessment Act, (EP&A Act), 1979 and Section 37 of the New South Wales Fisheries Management Act, 1994. No survey of fish species had been undertaken as part of the ecological assessment. There are no waterways present within the subject site to warrant a survey of native fish species. The proposal does not include any disturbance or modification to the adjacent Badgerys Creek riparian community or associated riparian vegetation.

It is mandatory by state legislation that consideration be given to threatened species of fauna and flora, endangered populations and endangered ecological communities under the TSC Act, the EP&A Act and the Fisheries Management Act respectively. In the instance where it can be demonstrated that threatened species, endangered populations or endangered ecological communities occur or are considered likely to occur within the subject site, then an Eight Part Test of Significance (Section 5A of the EP&A Act, 1979) must be applied to those threatened species, endangered populations or endangered ecological communities.

The Threatened Species Conservation Act consists of two broad categories of threatened species viz: E1 (Endangered) and V (Vulnerable). These two classifications are defined as follows:

E1: E1 (Endangered) meaning “species is likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary developments cease to operate; or, its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction; or, it might already be extinct, but it is not presumed extinct”.

V: The coding V ‘Vulnerable’ is defined “species that is likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate” (Threatened Species Conservation Act, 1995).

The state legislative process enables the determination and likely impacts of any given proposal or action on threatened species, endangered populations or endangered ecological communities under the terms of the Threatened Species Conservation Act. The TSC Act undergoes periodic review for refinement purposes, as new information is coming to light on flora and fauna species existing population status through time. As a

consequence, the Scientific Committee (established under the terms of the Threatened Species Conservation Act) has prepared amendments to the initial Act to include addendum determinations to incorporate additional flora and fauna species, endangered populations (under Part 2, Schedule 1) and endangered ecological communities (Part 3, Schedule 1).

The Scientific Committee has also made a determination to declare several key threatening processes under the Act. These listings include the predation by the European Fox *Vulpes vulpes*, Mosquito Fish *Gambusia holbrooki* and clearing of native vegetation and recent determinations to include 'Bushrock Removal' and 'Competition from honeybees *Apis mellifera*' as 'Key Threatening Processes' in Schedule 3 of the Act. These key threatening processes were all considered during this ecological assessment. Direct or relevant key threatening processes considered during the ecological assessment is confined to the clearing of native vegetation as a 'Key Threatening Processes' under Schedule 3 of the Act.

The introduced Mosquito Fish *Gambusia holbrooki* is present within the adjacent Badgerys Creek (personal observation). The infestation of this species is likely to sterilise the breeding habitat to the Green & Golden Bell Frog. Breeding sites of the Green & Golden Bell Frog is almost completely restricted to water bodies lacking the *Gambusia holbrooki* (NPWS Final Determination, Predation by *Gambusia holbrooki*, Key Threatening Process, 1999).

As the Threatened Species Conservation Act is in a state of regular review to suit the conservation needs of the State, in time it is expected that additional threatened species (including invertebrates), endangered populations and endangered ecological communities will be incorporated into the Act. For instance, the Grey-headed Flying Fox *Pteropus poliocephalus* and the Eastern Pygmy Possum *Cercartetus nanus* had been listed in a preliminary determination to be included as threatened species under the terms of the NSW Threatened Species Conservation Act. Both of these species are now legally declared as threatened species under the Act and were considered and targeted during the field assessments. The National Parks & Wildlife Service has recently drafted a Discussion Paper on proposed amendments to Section 5A of the Environmental Planning & Assessment Act (EP&A Act), 1979 resulting from the NSW Parliament's recent review of the Threatened Species Conservation Act, 1995. The Parliament has recommended that the Eight Part Test of Significance under Section 5A of the EP&A Act be reviewed. The amendments to the EP&A Act include that consideration be given to threatened species of fish and marine vegetation listed in Schedules 4 and 5 of the Fisheries Management Act, 1994. Changes to the 'wording' of the Eight Part Test are also proposed, however, the existing legislation and the existing Eight Part Test apply to

this current ecological study and has been used to determine impacts on threatened species, endangered populations and endangered ecological communities.

Finally, the subject site is not affected by the planning instruments State Environmental Planning Policy-14 (Coastal Wetlands), State Environmental Planning Policy-19 (Bushland in Urban Areas). Moreover, State Environmental Planning Policy-44 (Koala Habitat Protection) is not triggered as Penrith is not listed within Schedule 1 of SEPP-44 as an LGA to be considered relevant to the SEPP and that the subject site does not qualify as 'potential Koala habitat' under the terms of SEPP-44. In view that SEPP-44 does not apply in this instance, an Eight Part Test of Significance is warranted as one of the primary or potential Koala food tree species is present on-site viz: the Forest Red Gum *Eucalyptus tereticornis*.

3.0 DEGREE OF DISTURBANCE:

The degree of disturbance of the subject site is considered to be moderate. Clearing of the understorey has previously been undertaken and that there is limited understorey redevelopment or regeneration. The subject site is considered by the consultant as a modified form of Cumberland Plain Woodland-endangered ecological community. There is an access road leading directly to the subject site. Areas immediately to the south are highly disturbed with these areas being a landfill site. No other anthropogenic disturbances are apparent. Problematic weed species consist of the Inkweed, Deadly Nightshade and Fleabane.

4.0 THE PROPOSAL:

It is proposed that the subject site be cleared of the remaining residual vegetation and that the waste treatment facility be installed. It is also proposed that landscaping works be undertaken and will include revegetation works along the northern boundary and selected landscaped areas of the facility. The species proposed to be utilised for the revegetation works will be confined to plants associated with Cumberland Plain Woodland endangered ecological community. The revegetation works will be carried out by Landcare.

5.0 PREVIOUSLY RECORDED THREATENED FLORA & FAUNA SPECIES FOR THE LOCALITY:

Table 1, indicates the flora species that are known to occur within a five kilometre radius of the subject site and environs. Table 2 outlines threatened species of fauna known to occur.

TABLE 1

FLORA

FAMILY NAME	SCIENTIFIC NAME	HABITAT RELEVANCE TO THE SUBJECT SITE
Mimosaceae	<i>Acacia pubescens</i>	Broad habitat present. However, species not recorded.
Fabaceae	<i>Dillwynia tenuifolia</i>	Nil habitat present and species not recorded.
Fabaceae	<i>Pultenaea parviflora</i>	Nil habitat present and species not recorded.
Proteaceae	<i>Grevillea parviflora</i>	Nil habitat present and species not recorded.
Proteaceae	<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Nil habitat present and species not recorded.
Proteaceae	<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Nil habitat present and species not recorded.
Proteaceae	<i>Persoonia nutans</i>	Nil habitat present and species not recorded.
Lobeliaceae	<i>Hypsela sessiliflora</i>	Nil habitat present and species not recorded.

TABLE 2

THREATENED FAUNA KNOWN TO OCCUR WITHIN 5
KILOMETRES RADIUS OF THE SUBJECT SITE

VERNACULAR NAME	SCIENTIFIC NAME	RELEVANCE OF HABITAT ON SITE
Eastern (Common) Bent-winged Bat	<i>Miniopterus schreibersii</i> (V)	Potential foraging habitat only. There are no caves or similar artificial roosting habitats present on-site.
Eastern Free-tailed Bat	<i>Mormopterus norfolcensis</i> (V)	Potential marginal foraging habitat only. No tree hollows suitable for roosting are present within the subject site.
Cumberland Plain Land Snail	<i>Meridolum comeovirens</i> (E1)	Marginal potential habitat present, however habitat within subject site is mostly destroyed. Species recorded within the adjacent riparian land.

(V) denotes 'vulnerable' under the NSW Threatened Species Conservation Act, 1995.

(E1) denotes 'endangered' under the NSW Threatened Species Conservation Act, 1995.

TABLE 3
FAUNA

OTHER THREATENED FAUNA KNOWN TO OCCUR WITHIN THE
BROADER DISTRICT OR BIOREGION

VERNACULAR NAME	SCIENTIFIC NAME	RELEVANCE OF HABITAT ON SITE
Bush Stone Curlew	<i>Burhinus grallarius</i>	Very broad habitat present.
Glossy Black Cockatoo	<i>Calyptorhynchus lathamii</i>	Nil.
Swift Parrot	<i>Lathamus discolor</i>	Potential feeding habitat only.
Turquoise Parrot	<i>Neophema pulchella</i>	Unlikely habitat.
Powerful Owl	<i>Ninox strenua</i>	Broad foraging & roosting habitat present within adjacent riparian community.
Barking Owl	<i>Ninox connivens</i>	Broad foraging and roosting habitat present within adjacent riparian community.
Masked Owl	<i>Tyto novaehollandiae</i>	Broad foraging habitat present throughout.
Regent Honeyeater	<i>Xanthomyza phrygia</i>	Marginal foraging habitat.
Koala	<i>Phascolarctos cinereus</i>	Food tree <i>Eucalyptus tereticornis</i> present. However, species is likely to be extinct within the locality
Spotted-tailed (Tiger) Quoll	<i>Dasyurus maculatus</i>	Potential marginal foraging habitat present within the adjacent riparian community habitat.
Squirrel Glider	<i>Petaurus norfolcensis</i>	Potential foraging habitat present within nearby riparian community.
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	Habitat present during inflorescence of trees. Species highly likely to forage within trees at night. No roosting habitat present.

Little Bent-winged Bat	<i>Miniopterus australis</i>	Potential foraging habitat only. There are no caves or similar artificial roosting habitats present within the subject site for the species.
Large-footed Myotis	<i>Myotis adversus</i>	Potential marginal foraging habitat present only.
Yellow-bellied Sheath-tailed Bat	<i>Saccolaimus flaviventris</i>	Potential foraging habitat only. There are no suitable roosting habitats present within the subject site for the species.
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	Potential marginal foraging habitat only. Species more likely to forage within adjacent riparian habitat.
Green & Golden Bell Frog	<i>Litoria aurea</i>	Marginal habitat present in nearby Badgerys Creek, however, breeding habitat is likely to be sterilised due to infestation by Mosquito Fish.
Red-crowned Toadlet	<i>Pseudophryne australis</i>	Nil habitat present.

BOLD TYPE INDICATES THAT AN EIGHT PART TEST OF SIGNIFICANCE HAS BEEN APPLIED TO THE THREATENED SPECIES.

6.0 VEGETATION & FLORISTICS METHODOLOGY:

The vegetation community and associated floristics were assessed entirely on foot and were conducted throughout the subject site. Vascular plant species (including the introduced species) were factored into the overall ecological assessment. The height, canopy structure, ecological significance and floristic composition were ascertained on-site. Trees, shrubs, sub-shrubs, climbers, ferns, graminoides, monocotyledons and herbaceous representatives were taken into account and described if present. Vegetation transects and random meander based assessments had both been undertaken within the subject site. Special emphasis was placed on locating threatened species of flora and ROTAP (**R**are **O**r **T**hreatened **A**ustralian **P**lants), uncommon species, species with poor representation in existing regional National Park estate and species of flora with known geographical limits of the locality. The entire subject site as an entity had been surveyed for its floristic species composition with special emphasis being placed on the occurrence

of threatened species. Finally, no ROTAP (Rare Or Threatened Australian Plants) were found within the subject site and are unlikely to occur.

7.0 FAUNAL HABITAT ASSESSMENT:

The fauna habitat assessment of the subject site had been determined for the likely present and or use of the subject site by threatened species known to occur in the locality and within the broader district. No field surveys had been undertaken *per se* such as spotlighting, trapping, frog or owl call analysis. Nonetheless, a habitat assessment is considered to be sufficient in this instance due to the high degree of ecological disturbance to the subject site. Should the area of impact have included the adjacent riparian community, then a full-scale detailed flora and fauna survey would have been warranted including a specialist microbat survey.

The potential faunal composition especially in relation to threatened species requirements had been assessed and ascertained in relation to the local ecological significance of those habitats in relation to the overall context of the locality of the subject site and environs. Habitat fragmentation and the severing of wildlife corridors and the occurrence of anthropogenic barriers, structures or mechanical inhibitors were also considered during the habitat assessment.

Keystone or critical food plants were considered for threatened species potential of occurrence and utility within the subject site eg: the inflorescence of trees including *Melaleuca nodosa*, *Melaleuca sieberi* and *Melaleuca styphelioides*.

8.0 RESULTS:

8.1 VEGETATION COMMUNITIES & FLORISTICS:

One main vegetation community is present within the subject site. This vegetation community is a modified and disturbed form of Cumberland Plain Woodland-endangered ecological community. Other vegetation communities present adjacent to the subject site include the Sydney Coastal River Flat Forest. This vegetation community is situated within and constitutes the riparian community along the Badgerys Creek. The remaining vegetation communities include the Cooks River/Castlereagh Ironbark Forest and the Shale Gravel Transition Forest. The above vegetation communities are listed as Endangered Schedule 1 of the NSW Threatened Species Conservation Act, 1995. The

Cooks River/Castlereagh Ironbark Forest and the Shale Gravel Transition Forest vegetation communities are not located adjacent to the subject site, however both of these communities are located within the environs of the broader study area. Nonetheless, the proposal will not have a significant effect on the above endangered ecological communities. The subject site contains a small remnant of Cumberland Plain woodland. Nonetheless, this remnant is isolated or disjunct from other nearby or contiguous woodlands in the locality even though the subject site has been mapped as an area to 'Support to Core Habitat'.

TREES:

The arborescent vegetation present within the subject sit is approximately 20 metres in height however, some individuals are taller and other species tend to be smaller in height. The vegetation tends to be sporadic due to past clearing activities. The tree species present are all generally species that are associated or consistent with the Cumberland Plain Woodland endangered ecological community. The species present consist of the Forest Red Gum *Eucalyptus tereticornis*, Grey Box *Eucalyptus moluccana*, Thin-leaved Stringybark *Eucalyptus eugenioides*, Rough-barked Angophora *Angophora floribunda*, Prickly Paperbark *Melaleuca styphelioides*, Honey-ball Myrtle *Melaleuca nodosa*, *Melaleuca sieberi*, *Melaleuca decora*, *Acacia parramattensis* and the Swamp Oak *Casuarina glauca*. It would have been expected that the initial vegetation community would have been of a higher species diversity. However, due to past clearing and grazing activities, the species diversity is relatively low. This is especially the case with the lower understorey vegetation consisting of shrubs, herbaceous and monocotyledonous taxa. It is difficult to determine the former understorey floristic composition.

SHRUBS & SUB-SHRUBS:

Only a few shrub species are present within the subject site. Notwithstanding this paucity, the species composition consist of the Black Thorn *Bursaria spinosa*, Sickle Wattle *Acacia falcata*, Needlebush *Hakea sericea* and *Dillwynia sieberi*. Noteworthy that three of the above shrub species are spinescent or have pungent apices.

OTHERS: (MONOCOTYLEDONS, CLIMBERS & GRAMINOIDES):

Other species consist of the small prostrate climber the False Sarsaparilla *Hardenbergia violacea*, Fleabane *Conyza bonariensis* (exotic), Cobblers Pegs *Bidens pilosa* (exotic), Deadly Nightshade *Solanum nigrum* (exotic), Inkweed *Phytolacca octandra* (exotic), Blackberry *Rubus* sp (exotic), Moth Vine *Araujia hortorum* (exotic), Fireweed *Senecio*

madagascariensis (exotic), Kangaroo Grass *Themeda australis*, Couch *Cynodon dactylon*, Rhodes Grass *Chloris gayana* (exotic), Paspalum *Paspalum dilatatum* (exotic) and the aquatic plant Bullrush *Typha orientalis*.

COMMENTS:

No threatened species of flora were recorded during the field assessments of the subject site and none are expected to occur. Furthermore, no ROTAP (Rare Or Threatened Australian Plants) were recorded. Several of the above tree, shrub and herb species are associated with the Cumberland Plain Woodland endangered ecological community's assemblage of plants even though none of the above plants recorded are actually endangered *per se*.

8.2 FAUNA HABITATS:

MAMMALIANS:

Both native and exotic (introduced) species of fauna are expected to occur. Threatened species likely to occur include the Grey-headed Flying Fox *Pteropus poliocephalus* (Schedule 2, Threatened Species Conservation Act, 1995). The introduced House Mouse *Mus musculus* and the Pacific Black Rat *Rattus rattus* are expected to be present. It is possible that the Swamp Rat *Rattus lutreolus* and the Southern Bush Rat *Rattus fuscipes* are present within the adjacent riparian community habitat.

It is also possible that the Common Ring-tailed Possum *Pseudocheirus peregrinus*, Sugar Glider *Petaurus breviceps* and the Squirrel Glider *Petaurus norfolcensis* (Schedule 2, Threatened Species Conservation Act, 1995) may also occur at an unknown period of time. The Squirrel Glider may enter the subject site during the inflorescence (flowering) stage of the eucalypts. The Common Brush-tailed Possum *Trichosurus vulpecula* is also expected to occur. No Common Ring-tailed Possum dreys (nests) were observed within the subject site. However, the species would normally be expected to forage within vegetation communities similar to that within the subject site. The introduced European Fox *Vulpes vulpes* is expected to be present. Scats pertaining to the European Rabbit *Oryctolagus cuniculus* had been noted on-site.

NOCTURNAL AVIANS:

It is possible that the Powerful Owl *Ninox strenua* (Schedule 2, Threatened Species Conservation Act, 1995) and the Barking Owl *Ninox connivens* (also Schedule 2, Threatened Species Conservation Act) may forage and roost within the adjacent riparian community habitat along the Badgerys Creek. Other nocturnal avians expected to occur include the Tawny Frogmouth *Podargus strigoides*, Australian Owlet Nightjar *Aegotheles cristatus* (locally significant), Barn Owl *Tyto alba* and the Boobook Owl *Ninox novaeseelandiae*. The Masked Owl *Tyto novaehollandiae* (Schedule 2, Threatened Species Conservation Act, 1995) may forage on occasions within the broader study area adjacent to the subject site.

HERPTOFAUNA:

The reptile species expected to occur include the Common Blue-tongued Lizard *Tiliqua scincoides*, Golden Water Skink *Eulamprus quoyii*, Garden Skink *Lampropholis guichenoti*, Jacky Dragon *Amphibolous muricatus*, Lace Monitor (goanna) *Varanus varius*, Eastern Water Dragon *Physignathus lesueurii*, Bearded Dragon *Pogona barbata*, Three-toed Skink *Saiphos equalis*, Eastern Brown Snake *Pseudonaja textilis*, Swamp Snake *Hemiaspis signata* and the Common Black Snake *Pseudechis porphyriacus*. No threatened species of reptiles are expected to occur.

Very few frog species are likely to occur, however, in exceptional rainfall episodes, several species may enter the subject site. These species may include the Eastern Dwarf Tree Frog *Litoria fallax*, Keferstein's Tree Frog *Litoria dentata*, Common Froglet *Ranidella signifera*, Brown-striped Marsh Frog *Limnodynastes peroni*, Peron's Tree Frog *Litoria peroni*, Lesueur's Frog *Litoria lesueurii*, Great Green Tree Frog *Litoria caerulea* and Verreaux's Frog *Litoria verreauxi*. The subject site is not suitable habitat for the Red-crowned Toadlet *Pseudophryne australis* (Schedule 2, Threatened Species Conservation Act, 1995) or the Giant Burrowing Frog *Heleioporus australiacus*. The Green & Golden Bell Frog *Litoria aurea* (Schedule 1, Threatened Species Conservation Act, 1995) is likely to have been eradicated from the adjacent Badgerys Creek by the predation on the eggs and larvae (tadpoles) by the introduced Mosquito Fish *Gambusia holbrooki*.

9.0 DISCUSSION:

9.1 FLORA:

Acacia pubescens:

Acacia pubescens is a spreading shrub that grows to about four metres high. The species occurs in open sclerophyll forest and woodland on clay soils (Harden, 1991). The subject site's ecological parameters are similar habitat to that of *Acacia pubescens*, however, this species was found to be absent from the subject site. An Eight Part Test of Significance is applied in this instance and is appended to this ecological report.

Dillwynia tenuifolia:

Dillwynia tenuifolia had been provisionally considered to occur on-site. However, specimens of a *Dillwynia* sp collected from the subject site had been sent to Dr. Peter Weston (Fabaceae botanist) of the Royal Botanic Gardens (Sydney). The plant specimens were identified as the sibling species *Dillwynia sieberi* and not *D. tenuifolia*. *D. sieberi* is a common species occurring the broader study area of Kemps Creek (Dr. Peter Weston, pers comm). No *Dillwynia tenuifolia* plants are present within the subject site and that proposal will not have a significant effect on this species or its habitat.

***Grevillea juniperina* subsp. *juniperina*:**

Grevillea juniperina is a prostrate to erect shrub that grows in moist sites often besides creeks on acidic soils (Harden, 1991). The subject site cannot be considered as a 'moist' site due to the exposed and xeric nature of the site including edaphic conditions, however the adjacent Badgerys Creek's riparian community may qualify as habitat for the species. The proposal is unlikely to have a significant effect on *Grevillea juniperina* subsp. *juniperina* or its habitat.

***Grevillea parviflora* & *Grevillea parviflora* subsp. *parviflora*:**

Grevillea parviflora is an erect to spreading shrub that is widespread in dry sclerophyll forest. *Grevillea parviflora* was found to be absent from the subject site and that proposal will not have a significant effect on the species.

***Grevillea parviflora* ssp. *parviflora* (Schedule 2, Threatened Species Conservation Act, 1995)**

Grevillea parviflora ssp. *parviflora* is found from Prospect and the lower Georges River to Camden, Appin and Cordeaux dam area in the south with disjunct populations in the north near Putty, Cessnock and Cooranbong (Makinson, 2002 in Bell & Driscoll, 2002). *Grevillea parviflora* ssp. *parviflora* is not present within the subject site.

***Persoonia nutans*:**

Persoonia nutans is an erect to spreading shrub that occurs in woodland to dry sclerophyll forests on lateritic and alluvial sands and is confined to the Cumberland Plain (Harden, 1991). *Persoonia nutans* was not recorded within the subject site and is unlikely to occur. Moreover, the proposal is unlikely to have a significant effect on *Persoonia nutans* or its habitat.

***Pultenaea parviflora*:**

Pultenaea parviflora is an erect shrub with appressed-pubescent stems. The species occurs in dry sclerophyll forests on Wianamatta Shale, lateritic or alluvial soils on the Cumberland Plain (Harden, 1991). An on-site survey targeting *Pultenaea parviflora* had been undertaken by the consultant, however, this species appears to be absent from the subject site. The proposed installation of the waste treatment facility is unlikely to have a significant effect on this species or its habitat.

***Hypsela sessiliflora*:**

Hypsela sessiliflora is a very rare prostrate perennial herb that occurs in damp places on the Cumberland Plain (Harden, 1992). The subject site is not considered to be situated in a 'damp place'. The subject site is situated in a higher and drier site locale. The adjacent Badgerys Creek may qualify as a 'damp place'. Nonetheless, an Eight Part Test of Significance is not warranted in this instance.

**CUMBERLAND PLAIN WOODLAND
ENDANGERED ECOLOGICAL COMMUNITY:
(Part 3, Schedule 1, Threatened Species Conservation Act, 1995)**

The Cumberland Plain Woodland is listed as an endangered ecological community on Part 3 of Schedule 1 of the NSW Threatened Species Conservation Act, 1995. The Scientific Committee (as appointed under the Threatened Species Conservation Act, 1995) has determined that only 6% of the original community had remained in 1988 in the form of small and fragmented stands.

Threats to the Cumberland Plain Woodland vegetation community include ‘clearing, grazing, hobby farms, poultry farms, housing and other developments, invasion by exotic plants and increase in nutrient loads due to fertiliser runoff from gardens and farmland, dumped refuse or sewer discharge’ (N.P.W.S., Final Determination). An Eight Part Test of Significance has been applied to the Cumberland Plain Woodland.

9.2 FAUNA:

**Grey-headed Flying Fox *Pteropus poliocephalus*
(Schedule 2, Threatened Species Conservation Act, 1995)**

The Grey-headed Flying Fox *Pteropus poliocephalus* forages widely throughout the bioregion and can be observed in almost any locality at night even in suburban and city areas due to its high capability of movability and its large conspicuous size as silhouettes through the night sky. The primary Grey-headed Flying Fox colony in Sydney is the Gordon colony at Gordon. This species radiates out from the colony into woodland, open forest and rainforest areas in the broader district to forage on flowering trees including eucalypts, Melaleuca and Banksia trees (pers obs). The Grey-headed Flying Fox also forages on large fruiting fig trees and commercial fruit trees. There are no roosting or camp sites for the Grey-headed Flying Fox present within or adjacent to the subject site. The proposal will not have a significant effect on the Grey-headed Flying Fox as individuals of this species will still forage on the existing trees within the subject site following the development of the subject site. An Eight Part Test of Significance has been prepared for the Grey-headed Flying Fox and is appended to this ecological report.

Powerful Owl *Ninox strenua*: (Schedule 2, Threatened Species Conservation Act, 1995)

The Powerful Owl occurs in open forests habitats within the region (personal observation) and (O'Brien, 1990). The Powerful Owl prefers to roost within deep gullies and rainforest habitats where adequate canopy shelter is afforded. The subject site does not contain steep gullies or rainforest habitats. However, the adjacent riparian community does contain dense overstorey vegetation. The Powerful Owl (and all other species of owls known to occur within the bioregion) had been sought throughout the entire subject site. Owl white-wash excreta, pellets, primary wing feathers and other signs of owls were sought. No evidence of the Powerful Owl had been located within the subject site. Nonetheless, it is expected that this species forages within locality of the subject site on an ad hoc basis in search of prey-food to the species such as the Grey-headed Flying Fox during the flowering period of the various eucalypts and Melaleuca species.

The Powerful Owl is known to predate on the Grey-headed Flying Fox and other arboreal mammals such as possum species. There are no nesting or appropriate roosting sites available within the subject site for the Powerful Owl. The known distribution of the Powerful Owl is south-eastern Australia from the Dawson River, Queensland to south-east South Australia (Slater et al, 1992). The proposal is unlikely to have a significant effect on the Powerful Owl.

Regent Honeyeater *Xanthomyza phrygia*: (Schedule 1, Threatened Species Conservation Act, 1995)

The Regent Honeyeater *Xanthomyza phrygia* is listed in Schedule 1 (Endangered) of the NSW Threatened Species Conservation Act, 1995 and is classified as endangered under the Commonwealth Endangered Species Protection Act, 1992. The NSW Preliminary Recovery Plan for the Regent Honeyeater lists 22 Local Government Areas (LGA) that are regularly used by the Regent Honeyeater. The Penrith Local Government Area is known to have regular visits by the Regent Honeyeater and is infrequently recorded feeding on the inflorescence of the various woodland trees.

Notwithstanding this, individuals or populations of the Regent Honeyeater may occur within the subject site and the broader locality at any given time especially during the winter season and may remain generally undetected as nomadic individuals, residual flocks or transient immature birds.

The Regent Honeyeater occurs mainly in the box-ironbark open forests and riparian stands of *Casuarina* on the inland slopes of the Great Dividing Range (Menkhorst, Schedvin and Geering, 1998). However, the Regent Honeyeater also occurs in coastal open forests including Swamp Mahogany *Eucalyptus robusta* forests. The NSW Regent Honeyeater Preliminary Recovery Plan has been prepared in accordance with the New South Wales Threatened Species Conservation Act, 1995 and has not at this stage developed into a draft format (Peter Christie, Western Directorate, NPWS, personal communication). A draft federal Recovery Plan of the Regent Honeyeater has been circulated to major departmental conservation stakeholders for comments but has not at this stage been adopted by the Commonwealth department Environment Australia.

The current lack of endorsement of both the state and federal Recovery Plans render the strategic planning position of the Regent Honeyeater in a state of suspension. Menkhorst et al (1998) suggest that lack of access to dependable nectar flows at critical times, due to the clearance of fertile stands of food trees, poor health of many remnants and competition from other honeyeater species (namely Noisy Miners) may be a major cause of the overall declination of the Regent Honeyeater. This situation may be a factor that limits the occurrence of the Regent Honeyeater within the bioregion especially in regards to the Noisy Miner due to inter-specific competition between this species (the dominant aggressor) and the Regent Honeyeater.

Swift Parrot *Lathamus discolor*: (Schedule 1, Threatened Species Conservation Act, 1995)

The Swift Parrot is a winter visitor to the Penrith Local Government Area. The Swift Parrot breeds in Tasmania and the Furneaux group of island in Bass Strait. Regionally, the Swift Parrot feeds on the blossoms of Blackbutts *Eucalyptus pilularis* and other eucalypts including the Swamp Mahogany. The Swift Parrot also feeds on the blossoms of the Broad-leaved Paperbark *Melaleuca quinquenervia* (personal observation). It is possible that the Swift Parrot would also feed on the blossoms of the Forest Red Gum *Eucalyptus tereticornis*. The proposal will not have a significant effect on the Swift Parrot or its habitat.

Koala Phascolarctos cinereus:
(Schedule 2, Threatened Species Conservation Act, 1995)

The subject site contains one of the known primary Koala food tree the Forest Red Gum *Eucalyptus tereticornis* under the terms of State Environmental Planning Policy-44 (Koala Habitat Protection). SEPP-44 is not triggered in this instance as the Penrith LGA is not listed as an LGA obliged to administer this SEPP. A search for Koalas and Koala scats and positive scratch marks on the boles of the trees had been undertaken by the consultant. However, no evidence of the Koala or its biological indicators had been recorded. The known geographic distribution of the Koala is north Queensland, south-eastern Queensland, and coastal NSW, parts of coastal and inland Victoria and small residual colonies in South Australia. The proposal is unlikely to have a significant effect on the Koala.

Giant Barred River Frog Mixophyes iterates: (Schedule 2, Threatened Species Conservation Act, 1995)

The subject site contains no habitat for the Giant Barred River Frog *Mixophyes iterates*. However, the adjacent riparian community does contain broadly suitable habitat for the species including potential breeding habitat. There are no suitable breeding or shelter habitats present within the subject site for *Mixophyes iterates*. The proposal will not have a significant effect on *Mixophyes iterates* or its habitat.

Red-crowned Toadlet Pseudophryne australis: (Schedule 2, Threatened Species Conservation Act, 1995)

The Red-crowned Toadlet occurs within open forests, woodlands, swamp-heaths and on rocky slopes and ridges (personal observation). The distribution of this species is within a 160 kilometre radius of Sydney mostly within the Hawkesbury sandstone formation (Cogger, 1994). This species is unlikely to be present within the subject site or environs due to the lack of suitable habitat for the species in the locality. There are no sandstone habitats present within or adjacent to the subject site. There are no bushrock floaters present within the subject site for the Red-crowned Toadlet. However, the allied species *Pseudophryne bibroni* may be present in the locality of the subject site. The subject site is suitable habitat to *Pseudophryne bibroni* however *Pseudophryne bibroni* is not a threatened species.

The Red-crowned Toadlet is one of the most common and well represented threatened species within the bioregion's National Park estate and occurs within the Ku-ring-gai, Garigal, Royal, Blue Mountains, Heathcote, Yengo, Dharug and Popran National Parks (personal observation). In my view, the Red-crowned Toadlet is one of the most well-reserved threatened species at this stage due to its high representation within the regional National Park estate based on the extensive distribution of Hawkesbury sandstone geological units. It is highly unlikely that the species is present within the Kemps Creek area based on habitat parameters. A significant effect on this species as a result of the proposal is unlikely to occur.

Glossy Black Cockatoo *Calyptorhynchus lathami*: (Schedule 2, Threatened Species Conservation Act, 1995)

The Glossy Black Cockatoo is an extremely conspicuous large black cockatoo and is a specialist niche feeder of the Forest Oak *Allocasuarina torulosa* located in open forests (personal observation). The Glossy Black Cockatoo occurs from central coastal Queensland, eastern NSW and north-eastern Victoria. There is an isolated population on Kangaroo Island in South Australia (Slater, Slater & Slater, 1992). The Glossy Black Cockatoo is listed as vulnerable within the Threatened Species Conservation Act, 1995. The primary food plant for this species within the bioregion is the Forest Oak *Allocasuarina torulosa* (personal observation). The Glossy Black Cockatoo when feeding on this food plant species tends to chew the fruiting cones of the plant and discards the cones onto the forest floor. There are no *Allocasuarina torulosa* trees present within the subject site, however, the allied tree species the Swamp Oak *Casuarina glauca* is present.

These *Casuarina* trees had been examined for evidence of chewed fruiting cones pertaining to the Glossy Black Cockatoo as a precautionary measure, however, no evidence was found to substantiate the utility of these trees by the Glossy Black Cockatoo and no chewed cones were located. A significant effect on the Glossy Black Cockatoo is unlikely to occur as a result of the proposal. Although the species is unlikely to utilise the subject site, it is expected that the Glossy Black Cockatoo would traverse through or pass overhead of the subject site on a regular basis.

AVIANS OF LOCAL & REGIONAL SIGNIFICANCE:

White-bellied Sea Eagle *Haliaeetus leucogaster*:

There is no suitable habitat for the White-bellied Sea Eagle present within the subject site. Ironical to this statement the White-bellied Sea Eagle is present within the adjacent riparian community habitat and is actually nesting within that community (personal observation). The White-bellied Sea Eagle is generally a marine, lacustrine or riverine piscivorous species. However, the removal of woodland vegetation will not have a significant effect on the White-bellied Sea Eagle or its habitat. It is expected that the White-bellied Sea Eagle will continue to nest within the riparian community following development of the subject site. **However, it is critical that the riparian community habitat be continued to have restricted access to people to ensure that the White-bellied Sea Eagle will continue to nest and seek refuge!**

Grey Goshawk *Accipiter novaehollandiae*:

Although the Grey Goshawk was not listed as species of concern in this instance, the consultant had recorded a breeding pair of this species within the adjacent riparian community in association with the White-bellied Sea Eagle. The Grey Goshawk is a diurnal raptor of local significance and is probably now uncommon within western Sydney.

White-throated Needle-tail *Hirundapus caudacutus*:

The White-throated Needle-tail is also known in the vernacular as the Spine-tailed Swift. The White-throated Needle-tail does not actually 'land' within Australia as this species is a trans-equatorial migrant from the northern hemisphere. The White-throated Needle-tail arrives in Australian 'air-space' during October-November and flies, sleeps, drinks and eats on the wing. The White-throated Needle-tail is attracted to low-pressure cells, periods of very high humidity and potential thunderstorm activity. It is in this instance that insects namely termites and ants develop pre-dispersal wings and swarm into the air prior to thunderstorms where the White-throated Needle-tail predated on the termites and

ants during the insects pre-mating and dispersal flights. It is not possible to manage the habitat of the White-throated Needle-tail within the subject site in this instance.

Black-faced Monarch, Satin Flycatcher and the Rufous Fantail:

The Black-faced Monarch is a common migrant of eastern Australia and occurs in open forests, woodlands, rainforests and dense gullies. The Black-faced Flycatcher may occasionally enter the subject site, however, this species is more likely to occur within the more dense adjacent riparian community habitat.

The Satin Flycatcher is an uncommon migrant of thick gullies (Slater, Slater and Slater (1992)). The adjacent riparian community is more suitable habitat for the Satin Flycatcher in this instance.

Finally, in relation to the Rufous Fantail, this species is more frequently associated with dense open forests, rainforests and riparian communities (personal observation). Based on the above species preferred habitat is not woodland but are more aligned to dense habitats such as the adjacent riparian community along the Badgerys Creek. The proposal will not have a significant effect on the migratory habits of the Black-faced Monarch, Satin Flycatcher or the Rufous Fantail.

STATE ENVIRONMENTAL PLANNING POLICY-14 (COASTAL WETLANDS)

There are no designated State Environmental Planning Policy-14 (Coastal Wetlands) present within or adjacent to the subject site. There are no SEPP-14 wetlands present within the Penrith Local Government Area.

STATE ENVIRONMENTAL PLANNING POLICY-19 (URBAN BUSHLAND PROTECTION)

The Penrith Local Government Area is obliged to administer SEPP-19 (Urban Bushland Protection). Nonetheless, there are no public bushland reserves located adjacent to the subject site.

STATE ENVIRONMENTAL PLANNING POLICY-44 (KOALA HABITAT PROTECTION)

The subject site does not constitute either 'Core Koala Habitat' or 'Potential Koala Habitat' under the terms of the State Environmental Planning Policy-44 (Koala Habitat Protection). No further provisions of the SEPP-44 apply in this instance.

CAMBA: (China-Australia Migratory Bird Agreement)

There are no listed CAMBA (China-Australia Migratory Bird Agreement) sites present within or adjacent to the subject site.

JAMBA: (Japan-Australia Migratory Bird Agreement)

There are no JAMBA (Japan-Australia Migratory Agreement) sites present within or adjacent to the subject site.

RAMSAR SITES:

There are no RAMSAR (wetlands of international significance) sites present within or adjacent to the subject site. Australia is a signatory to this international wetlands agreement.

9.3 ENDANGERED POPULATIONS & ENDANGERED ECOLOGICAL COMMUNITIES:

Endangered populations currently listed under the NSW Threatened Species Conservation Act, 1995 within the broader Sydney bioregional context include the Little Penguin at Manly, Squirrel Glider on the Barrenjoey Peninsula (north of Bushrangers Hill), the Koala within the Pittwater Local Government Area, the Gosford Wattle *Acacia prominens* within the Hurstville and Kogarah Local Government Areas, *Hibbertia incana* within the Baulkham Hills Local Government Area and *Pomaderris prunifolia* within the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas. Additionally, there are endangered populations of *Darwinia fascicularis* subsp. *oligantha* within the Baulkham Hills and Hornsby Local Government Areas, an endangered population of the Gang Gang Cockatoo within the Hornsby and Ku-ring gai LGA's and an endangered population of *Keraudrenia corrolata* var. *denticulata* within the Hawkesbury LGA. Other known endangered populations are present elsewhere (ie: outside of the Sydney basin) within the state including the Koala at Hawkes Nest/Tea Gardens area within the Port

Stephens LGA. None of the above endangered populations are adjacent to or have any ecological or biological affiliation with the subject site or the broader study area.

In regards to endangered ecological communities, the subject site is a modified form of the Cumberland Plain Woodland and that the adjacent riparian community has been identified as Sydney Coastal River Flat Forest endangered ecological community as listed on Part 3, Schedule 1 of the NSW Threatened Species Conservation Act, 1995. The proposal will not have a significant impact on either of the above endangered ecological communities.

9.4 WILDLIFE CORRIDORS & HABITAT FRAGMENTATION:

The subject site has been identified as habitat to 'Support to Core Habitat' whereas the adjacent Badgerys Creek riparian community has been identified as 'Core Habitat'. The area identified as 'Support to Core Habitat' within the subject site is considered to be secondary habitat to that of 'Core Habitat' and would be considered as a buffer to core habitat. The proposed SITA facility will remove the 'Support to Core Habitat' vegetation but will not involve removal or damage to Core Habitat. Importantly, the proposal will not result in the severing of wildlife corridors for either flora or faunal species and will not result in habitat fragmentation as firstly movements of fauna populations will not be impeded and that habitat fragmentation will not eventuate in this instance as the entire riparian community habitat will not be dislocated from interconnecting habitats. The proposal does not include removal of vegetation within the riparian habitat precinct. All of the species expected to occur within the locality will still be able to traverse through the riparian community enroute to other vegetative links within the environs of the subject site.

10.0 CONCLUSIONS & RECOMMENDATIONS:

It is concluded that the subject site contains a disturbed and modified form of remnant Cumberland Plain Woodland as listed and described in the Final Determination under the NSW Threatened Species Conservation Act, (1995) on the Cumberland Plain Woodland endangered ecological community. The subject site may also contain habitat to that of the Cumberland Plain Land Snail and the rare plant *Acacia pubescens*. Nonetheless, no Cumberland Plain Land Snails or *Acacia pubescens* had been recorded within the subject site even though the Cumberland Plain Land Snail had been recorded by the consultant within the adjacent riparian community. Vegetation and habitat pertaining to the Sydney

Coastal River Flat Forest endangered ecological community appears to be confined to the adjacent riparian community and does not extend, overlap or incur into the subject site. No threatened species were actually recorded within the subject site and that a significant effect on threatened species, populations and endangered ecological communities listed under the NSW Threatened Species Conservation Act, 1995 or the or the Commonwealth's Environmental Protection & Biodiversity Conservation Act, 1999 as a result of the proposal is unlikely to occur in this instance.

The subject site does not contain either 'potential' or core Koala habitat under the terms of SEPP-44 (Koala Habitat Protection). There are no SEPP-14 (Coastal Wetlands) wetland areas or RAMSAR wetlands present within or adjacent to the subject site. Finally, an Eight Part Test of Significance pertaining to relevant threatened species of flora and fauna are appended to this ecological report.

RECOMMENDATIONS:

In view of the above conclusions, SITA Environmental Solutions proposed to contract LANDCARE to undertake revegetation works on-site. SITA proposes to revegetate a 600 metre area along the northern boundary of the subject site with species consistent with Cumberland Plain Woodland trees, shrubs and herbaceous species. This action is desirable, however it is considered that revegetation of the adjacent riparian community would be a more effective ecological initiative. There are considerable cleared open gaps within the riparian community and that revegetation within the riparian community would be a higher priority in this instance. Other recommendations include the following:

- * That the riparian community habitat area remain restricted to staff of SITA and that persons enter this area only for the purposes of vegetation management. No heavy machinery should be permitted to this area under any circumstances. Machinery and building materials including spoil mounds should not be stalled or placed within the riparian community habitat area.
- * That the amenity of the riparian community be protected to ensure that additional weed propagules are not introduced to the site. It is also important that the nesting habitat area of the White-breasted Sea Eagle is protected. Significant human activity within the riparian community may result in the White-breasted Sea Eagle to abandon the nest and the locality permanently.
- * That any landscaping works carried out within the facility compound consist of plantings consistent with Cumberland Plain Woodland trees, shrubs and herbaceous species.

APPENDIX 1

LIST OF PLANT SPECIES RECORDED WITHIN THE SUBJECT SITE:

MYRTACEAE:

Forest Red Gum *Eucalyptus tereticornis*

Grey Box *Eucalyptus moluccana*

Thin-leaved Stringybark *Eucalyptus eugenioides*

Rough-barked Angophora *Angophora floribunda*

Prickly Paperbark *Melaleuca styphelioides*

Honey-ball Myrtle *Melaleuca nodosa*

Melaleuca sieberi

Melaleuca decora

MIMOSACEAE:

Acacia parramattensis

Sickle Wattle *Acacia falcata*

CASUARINACEAE:

Swamp Oak *Casuarina glauca*

PITTOSPORACEAE:

Black Thorn *Bursaria spinosa*

PROTEACEAE:

Needlebush *Hakea sericea*

FABACEAE:

Dillwynia *Dillwynia sieberi*

False Sarsaparilla *Hardenbergia violacea*

ASTERACEAE:

Fleabane *Conyza bonariensis* (exotic)

Cobblers Pegs *Bidens pilosa* (exotic)

Fireweed *Senecio madagascariensis* (exotic)

SOLANACEAE:

Deadly Nightshade *Solanum nigrum* (exotic)

PHYTOLACCACEAE:

Inkweed *Phytolacca octandra* (exotic)

ROSACEAE:

Blackberry *Rubus* sp (exotic)

ASCLEPIADACEAE:

Moth Vine *Araujia hortorum* (exotic)

POACEAE:

Kangaroo Grass *Themeda australis*

Couch *Cynodon dactylon*

Rhodes Grass *Chloris gayana* (exotic)

Paspalum *Paspalum dilatatum* (exotic)

APPENDIX 2

EIGHT PART TEST OF SIGNIFICANCE

CUMBERLAND PLAIN WOODLAND (ENDANGERED ECOLOGICAL COMMUNITY)

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995.

‘Significant effect on threatened species, populations or ecological communities or their habitats’.

- (a) **Whether the life cycle of the Cumberland Plain Woodland is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.**

The Cumberland Plain Woodland is not a species *per se* as the Cumberland Plain Woodland is a community or assemblage of flora and fauna occurring within certain ecological parameters on the Cumberland Plain. This section of the Eight Part Test does not apply to the proposal.

- (b) **In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.**

The Cumberland Plain Woodland does not constitute a population *per se* as the Cumberland Plain Woodland is a community or assemblage of flora and fauna. This section of the Eight Part Test of Significance does not apply to the proposal.

- (c) **In relation to the regional distribution of the habitat of a threatened species, population or endangered ecological community, whether a significant area of known habitat is to be modified or removed.**

In relation to the regional distribution of the Cumberland Plain Woodland, a significant area of known habitat will not be modified or removed. The subject site’s Cumberland Plain Woodland is already disturbed, modified and generally remains in an isolated and fragmented state.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

No, the subject site is not contiguous with other areas of similar habitat that may contain Cumberland Plain Woodland. The subject site is isolated from interconnecting and proximate areas of remnants of Cumberland Plain Woodland.

(e) Whether critical habitat will be affected.

There is no formally declared listing of 'critical habitat' for the Cumberland Plain Woodland vegetation community at this stage under the terms of the Threatened Species Conservation Act, 1995.

(f) Whether a threatened species, endangered population or endangered ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Cumberland Plain Woodland vegetation community is poorly represented in conservation areas including national park estate.

(g) Whether the action proposed is of a class of action that is recognised as a threatening process.

Clearing of vegetation is a form of threatening process to that of endangered vegetation communities. However, the subject site is already semi-cleared or disturbed and that the proposal would not have a significant effect on the removal of Cumberland Plain Woodland within the Penrith LGA. It is also proposed that SITA Environmental Solutions will commission LANDCARE to undertake revegetation works within the vicinity of the subject site. The revegetation works will consist entirely of floristics associated with Cumberland Plain Woodland vegetation or Sydney Coastal River Flat Forest vegetation or both.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Cumberland Plain Woodland is found throughout the Cumberland Plain within the Sydney Basin. The subject site at Kemps Creek is not within a geographical limited area of the Cumberland Plain Woodland. The Cumberland Plain Woodland is found largely as isolated or fragmented stands within the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly Local Government Areas (NSW Scientific Committee, Final Determination, 1997). The Cumberland Plain Woodland vegetation community is found to the north, south, east and west of the subject site

APPENDIX 3

EIGHT PART TEST OF SIGNIFICANCE

Acacia pubescens

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995

‘Significant effect on threatened species, endangered populations or endangered ecological communities or their habitats’.

(a) Whether the life cycle of *Acacia pubescens* is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The life cycle of *Acacia pubescens* would not be disrupted by the development of the facility within the subject site as to cause a local population to be placed at risk of extinction. No *Acacia pubescens* plants were found to be present within the subject site.

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

There are no currently listed endangered populations of *Acacia pubescens* under the terms of the Threatened Species Conservation Act, 1995 at this stage.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

No, in relation to the regional distributional of habitat to *Acacia pubescens*, a significant area of habitat will not be modified or removed. This species was found not to occur within the subject site.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The development of the subject site would be unlikely to further isolate the potential habitat of *Acacia pubescens* from interconnecting or other proximate areas. The subject site does not contain *Acacia pubescens*.

(e) Whether critical habitat will be affected.

There is no critical habitat of *Acacia pubescens* formally declared at this stage as defined under the TSC Act, 1995.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The habitat of *Acacia pubescens* is poorly represented in the regional national park estate. It is unlikely that adequate representation in conservation reserves will ever be established for this species. All viable populations of this species should be retained for conservation purposes.

(g) Whether the action proposed is of a class of action that is recognised as a key threatening process.

Clearing of vegetation is a class of activity that is key threatening process to the habitat of rare plants under the terms of the Threatened Species Conservation Act, 1995. However, this species was not recorded within the subject site and is unlikely to occur.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

No, *Acacia pubescens* is not present within the subject site. The development of the proposed facility within the subject site would not affect the geographical distribution of *Acacia pubescens*.

APPENDIX 4

EIGHT PART TEST OF SIGNIFICANCE

SWIFT PARROT *Lathamus discolor*

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995

‘Significant effect on threatened species, endangered populations or endangered ecological communities or their habitats’.

(a) Whether the life cycle of Swift Parrot *Lathamus discolor* is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

No, the life cycle of the Swift Parrot is unlikely to be disrupted as a result of the development of the subject site to the extent to place a local viable population of the species at risk of extinction. The Swift Parrot does not breed within mainland Australia. The Swift Parrot may enter the subject site on an ad hoc basis to feed on winter flowering trees such as the Forest Red Gum *Eucalyptus tereticornis*. However, the removal of Forest Red Gum trees within the subject site to accommodate the proposal is unlikely to be of significant numbers to have a significant effect on the Swift Parrot. The Swift Parrot breeds in Tasmania and associated Bass Strait islands including in the Furneaux group of islands. The Swift Parrot is a winter visitor to the south-east mainland states.

It is reiterated that the Swift Parrot breeds in Tasmania and associated Bass Strait islands; therefore, the life-cycle of the species would not be disrupted to such an extent to place Swift Parrot at risk of localised extinction. Moreover, additional Forest Red Gum trees will be replanted within or adjacent to the subject site by LANDCARE following or during the development of the subject site.

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

There is no currently listed “endangered population” of the Swift Parrot under the terms of the NSW Threatened Species Conservation Act, 1995 at this stage.

(c) In relation to the regional distribution of the habitat of a threatened species, endangered population or endangered ecological community, whether a significant area of known habitat is to be modified or removed.

The Swift Parrot is unlikely to use the habitat available in the subject site for roosting or nesting activities. The subject site may on occasions be utilised by the Swift Parrot during foraging activities and may forage on any winter flowering tree species within the district and environs during the winter season. The Swift Parrot nests and breeds in Tasmania and associated Bass Strait islands. Therefore a significant area of Swift Parrot habitat is not likely to be modified or removed as a result of the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The development of the subject site would not likely to isolate the habitat of the Swift Parrot from interconnecting or other proximate areas of suitable habitat as extensive areas of potential feeding habitat exist in the broader locality. Furthermore, the Swift Parrot is capable of aerially traversing forest and woodland remnants and residential areas to other contiguous open forest locales including crossing of Bass Strait on the species return to Tasmania.

(e) Whether critical habitat will be affected.

There is no “critical habitat” of the Swift parrot formally declared within the terms of the Threatened Species Conservation Act, 1995 at this stage.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

It is not expected that the Swift Parrot is adequately represented in nature conservation areas within N.S.W. as the species does not breed within the mainland states of Australia. The primary conservation efforts should be focused on protecting the species known feeding areas. Breeding habitat for the species is likely to be an issue for the Tasmanian and federal governments.

(g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

Clearing of native vegetation is a class of activity that is recognised as a threatening process to the habitat of avians. The subject site contains no nesting or roost sites to the Swift Parrot. Clearing of vegetation within the subject site would not have a significant effect on the Swift Parrot.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

No, the known distribution of the Swift Parrot extends from south-eastern Queensland to the Mt Lofty Ranges in South Australia on the mainland. The Swift Parrot is found throughout Tasmania (Slater, Slater & Slater, 1992). The Penrith LGA is not a geographical limited area to that of the Swift Parrot.

APPENDIX 5

EIGHT PART TEST OF SIGNIFICANCE

REGENT HONEYEATER *Xanthomyza phrygia*

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995

‘Significant effect on threatened species, populations or ecological communities or their habitats’.

(a) Whether the life cycle of the Regent Honeyeater *Xanthomyza phrygia* is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

No, the life cycle of the Regent Honeyeater will not be disrupted by the proposal to such an extent that a local population would be placed at risk of extinction. There are few records of the Regent Honeyeater in the district.

The Regent Honeyeater generally frequents ironbark forests and woodlands in N.S.W. (Alan Morris Ornithologist, pers comm). Webster & Menkhorst, (1992) concluded that Regent Honeyeater habitat preferences are quite variable and that the Regent Honeyeater usually requires one or more of a few select eucalypts species viz: Red Ironbark and Yellow Box. These habitats or associated floristics are not present within the subject site. The proposal is unlikely to cause a local viable population of the Regent Honeyeater to be placed at risk of extinction.

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No “endangered populations” of the Regent Honeyeater have been identified and determined by the Scientific Committee established by the Threatened Species Conservation Act, 1995 at this juncture.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

In relation to the regional distribution of Regent Honeyeater habitat, a significant area is unlikely to be modified or removed as a result of the proposal. SITA proposes to replant woodland trees within the subject site with assistance with LANDCARE. Species selected will also consist of food plant trees that the Regent Honeyeater is associated with.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal is not likely to isolate potential habitat of the Regent Honeyeater in the locality from interconnecting or other proximate areas. The subject site is already disjunct from interconnecting areas of habitat. Moreover, the Regent Honeyeater is capable of traversing over the subject site by aerial dispersal (flight).

(e) Whether critical habitat will be affected.

There is no “critical habitat” of the Regent Honeyeater formally declared in New South Wales under the terms of the Threatened Species Conservation Act, 1995 at this stage.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Regent Honeyeater is not well represented in regional national parks or other conservation systems in the state. All efforts should be made to conserve viable populations of the Regent Honeyeater populations in this state. A bioregional plan should be implemented by regional Local Governments to identify and protect significant areas of Regent Honeyeater habitat.

(g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

Clearing of native vegetation is a class of activity that is well recognised by naturalists as a threatening process to the habitat of threatened fauna including the Regent Honeyeater. However, the removal of prime feeding habitat of the Regent Honeyeater will not take place in this instance.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Regent Honeyeater has been recorded in areas north, south, east and west of the greater Sydney bioregion. The broader range of the Regent Honeyeater extends from south-eastern Queensland, through eastern NSW and coastal Victoria to north of Adelaide. Therefore the Regent Honeyeater cannot be considered to be at the limit of its range within the Penrith Local Government Area.

APPENDIX 6

EIGHT PART TEST OF SIGNIFICANCE

GREY-HEADED FLYING FOX *Pteropus poliocephalus*

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995

‘Significant effect on threatened species, endangered populations or endangered ecological communities or their habitats’.

(a) Whether the life cycle of the Grey-headed Flying Fox *Pteropus poliocephalus* is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The life cycle of the Grey-headed Flying Fox is unlikely to be disrupted by the proposal as the subject site is too small to support a viable population of this species. However, it is expected that the Grey-headed Flying Fox alights in trees within the subject site during inflorescence of the various eucalypts during the flowering period of each respective tree species. The subject site or the broader study area does not contain suitable roosting habitat of the Grey-headed Flying Fox as the subject site is too open and exposed and contains no tall open forest areas and is not conducive as a roosting habitat to the species.

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

There is no currently listed “endangered population” of the Grey-headed Flying Fox under the terms of the Threatened Species Conservation Act, 1995 at this stage.

(c) In relation to the regional distribution of the habitat of a threatened species, endangered population or endangered ecological community, whether a significant area of known habitat is to be modified or removed.

The Grey-headed Flying Fox is unlikely to use the habitat available in the study area for roosting activities, however the study area is in part potential foraging habitat of this species on a seasonal basis during night-time foraging activities. When eucalypts do flower, then the Grey-headed Flying Fox forages throughout the entire Sydney bioregion and the broader Sydney basin. Therefore a significant area of habitat is not likely to be modified or removed as a result of the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal is not likely to isolate the habitat of the Grey-headed Flying Fox from interconnecting or other proximate areas of suitable habitat, for this species forages over extensive areas of habitat in the greater Sydney bioregion and associated environs. Furthermore, the Grey-headed Flying Fox is capable of aerial traversing forest and woodland remnants and residential areas to other contiguous open forest locales and does not tend to become landlocked.

(e) Whether critical habitat will be affected.

There is no “critical habitat” of the Grey-headed Flying Fox formally declared within the terms of the Threatened Species Conservation Act, 1995 at this stage.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

It is not expected that the Grey-headed Flying Fox is adequately represented in nature conservation areas within N.S.W. though the species is expected to be more common in the bioregion than generally ascertained and is expected to present in all Sydney bioregional National Parks including the Sydney Harbour National Park during flowering periods of eucalypts and the fruiting of large fig trees including the Morton Bay Fig *Ficus macrophylla*.

(g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

Clearing of native vegetation and high frequency fires are formally declared as key threatening processes under the terms of the Threatened Species Conservation Act, 1995 that applies to the Grey-headed Flying Fox. The removal of vegetation within the subject site to accommodate the proposal does not constitute gross removal of native vegetation.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The known distribution of the Grey-headed Flying Fox extends to the north, south, east and west of the subject site and the broader study area and locality. The species range extends from central and south-eastern Queensland, south along the entire N.S.W. coast and eastern and central Victoria (Strahan, 1983).

APPENDIX 7

EIGHT PART TEST OF SIGNIFICANCE

CUMBERLAND PLAIN LAND SNAIL *Meridolum comeovirens*

Matters concerning 94 (2) of the Threatened Species Conservation Act, 1995

‘Significant effect on threatened species, endangered populations or endangered ecological communities or their habitats’.

(a) Whether the life cycle of the Cumberland Plain Land Snail *Meridolum comeovirens* is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The life cycle of the Cumberland Plain Land Snail is unlikely to be disrupted by the proposal as the understorey of the subject site sparse and that shelter sites for the Cumberland Plain Land Snail are limited. Nonetheless, the Cumberland Plain Land Snail had been recorded by the consultant within the adjacent riparian community habitat where a high degree of understorey vegetation and moisture is present. The proposal will not cause a local population of the Cumberland Plain Land Snail to be placed at risk of extinction.

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

There is no currently listed “endangered population” of the Cumberland Plain Land Snail under the terms of the Threatened Species Conservation Act, 1995 at this stage. The species is itself endangered.

(c) In relation to the regional distribution of the habitat of a threatened species, endangered population or endangered ecological community, whether a significant area of known habitat is to be modified or removed.

No, very limited habitat exists within the subject site for the Cumberland Plain Land Snail. The adjacent riparian habitat precinct is more suitable as habitat for the Cumberland Plain Land Snail. No developmental incursion will take place within the riparian community precinct. Therefore a significant area of habitat is not likely to be modified or removed as a result of the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal is not likely to isolate the habitat of the Cumberland Plain Land Snail from interconnecting or other proximate areas of suitable habitat. The subject site is already isolated from contiguous areas of suitable habitat.

(e) Whether critical habitat will be affected.

There is no “critical habitat” of the Cumberland Plain Land Snail formally declared within the terms of the Threatened Species Conservation Act, 1995 at this stage.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

No it is not expected that the Cumberland Plain Land Snail is adequately represented in nature conservation areas within the region. However, this species is probably represented in a number of the small nature conservation areas within the Cumberland Plain. However, adequate representation is unlikely.

(g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

Clearing of native vegetation and high frequency fires are formally declared as key threatening processes under the terms of the Threatened Species Conservation Act, 1995 that applies to the Cumberland Plain Land Snail. The removal of vegetation within the subject site to accommodate the proposal does not constitute gross removal of native vegetation.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The known distribution of the Cumberland Plain Land Snail extends to the north, south, east and west of the subject site and the broader study area and locality. The species is confined to the Cumberland Plain in western Sydney.

