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By email: amanda.blake@mirvac.com

2nd March 2020

# RE: Proposed rezoning - 55 Coonara Avenue West Pennant Hills Response to EES comments

Dear Amanda,

This letter is a response to the submission prepared by Environment, Energy and Science (formerly NSW Office of Environment and Heritage) dated and forwarded to Council on 19<sup>th</sup> November 2019, as well as their letter of 21<sup>st</sup> October 2019, received on 5<sup>th</sup> December 2019.

The EES responses detail a number of biodiversity issues that they consider have not been adequately addressed in the documentation provided to date; these are addressed each in turn below.

#### 1. Blue Gum High Forest (BGF) and Sydney Turpentine Ironbark Forest (STIF).

As has been explained previously in response to OEH queries following notification of the Planning Proposal, the original mapping and vegetation delineation that was used to identify the developable area was conservative, and it built in considerable redundancy because of the coarse resolution of some of the information that was available at the time. Where ambiguity existed, areas were assigned to a higher environmental category (e.g. naturally-occurring native vegetation) in preference to a lower category (e.g. excavated and landscaped garden). Note that the highest value "remnant forest on natural ground" is assigned to areas where there was no documentary evidence that it had been cleared. However, it is acknowledged that land grants in this part of West Pennant Hills were made to free settlers and freed convicts in the early days of the Sydney colony. Land was cleared and farms were quickly established, and therefore the areas denoted as "remnant" may in fact be old regrowth dating from the 1800s or early 1900s.

The Biodiversity Assessment (dated 8<sup>th</sup> February 2018) relied on this coarse analysis of **habitat types** to assist Council regarding the likely impacts of the Planning Proposal on the Powerful Owl and on the large remnant of bushland comprising BGHF and STIF in the site's southern part.

As previously noted, the total area of impact described at that time was made up of small patches located in areas where the aerial photography was ambiguous. A conservative approach was adopted until further and better information was available, and so those areas were assigned to the higher categories of ecological value.

Understanding their true nature has been greatly enhanced by further information such as detailed land survey, additional historical maps, additional aerial photography, and additional ecological and arboricultural site data. The resultant current vegetation map and the descriptions of each vegetation zone are shown in Figures 1a and 1b overleaf.

Using this map as the basis for establishment of Asset Protection Zone (APZ), the potential direct impact of the APZ is provided below in Table 1 (and illustrated in Figure 1a).

	TA	BLE 1: Impact of APZ (in reference to Vegetation Zo	nes, Rev A).	
Vegetatie Zone	on	Description	Within APZ (m²)	Total area on site (m²)
	1a	Exotic grassland on natural ground	0	14,282
	1b	Exotic grassland on natural ground with occasional planted trees	1,480	5,400
Other	2a	Detention basins	998	1,261
	2b	Dams	2,874	3,276
	3a	Highly modified edges not on natural ground	15,013	17,994
	4a	Formal landscaped garden not on natural ground	12,898	54,674
	5a	Regrowth BGHF (post 1943 and / or 1961) on natural ground in very low condition	1,303	5,279
BGHF	5b	Regrowth BGHF (post 1970) on natural ground in moderate condition	0	4,192
	5c	Old regrowth / remnant BGHF on natural ground in moderate to good condition	553	20,877
STIE	6a	Old regrowth / remnant STIF on natural ground with little understorey due to past management	0	34,963
STIF	6b	Old regrowth / remnant STIF on natural ground with natural understorey in moderate condition	458	36,730

Note that, in keeping with the original advice and intention of the proposal, the area of impact is almost entirely restricted to modified parts of the landscape.

As was signalled in previous correspondence, the area of impact on the EECs has been greatly reduced from the initial conservative estimate of 0.95 hectares, to only 0.23 hectares within the edges of the APZ.

In my opinion, this degree of potential impact is not sufficient to overturn the Planning Proposal.

In response to the specific request for the Rapid Data Points data, the locations of the 13 points are shown in Figure 1 and the floristic data used to differentiate BGFH from STIF are provided at Table 2.



FIGURE 1a: Vegetation Map, APZ, and 13 Rapid Data Points (red). Areas where the APZ coincide with natural vegetation types 5 and 6 are indicated.

Primary ide	ntifier Moderator	Name	Substrate	Habitat	Condition	Detail									
0	а	Built Form	Not natural ground	Buildings	NA	NA									
0	b	Built Form	Not natural ground	Car parks and roads	NA	NA									
1	а	Cleared Land	Natural ground	Exotic grassland	Low	Mostly exotic ground covers.     Regularly mown / slashed.     Previously part of the orchard.									
1	b	Cleared Land	Natural ground	Exotic grassland with scattered planted trees	Low	Mostly exotic ground covers.     Regularly mown / slashed.     Previously part of the orchard.     Small number of native trees planted.									
2	а	Basins and Dams	Not natural ground	Aquatic - intermittent (detention basins)	Low	Built structures that occasionally contain water.     Some exotic vegetation established.									
2	ь	Basins and Dams	Not natural ground	Dams	Moderate to Low	<ul> <li>Built structures that occasionally contain water.</li> <li>Supports some aquatic vegetation (native and exotic).</li> <li>Exotic vegetation includes infestation of the exotic Water Primrose.</li> </ul>									
3	a	Highly modified edges	Not natural ground	Planted and regrowth forest species	Low	<ul> <li>Very disturbed vegetation reflecting land use history.</li> <li>Underlying ground is not natural and includes spoil, batters around roads and dams, excavated land, constructed banks near bridges, reshaped slopes to facilitate water movement, and the cleared and compacted area used for the compound during construction of IBM facility.</li> <li>Overwhelmingly dominated by exotic species, particularly transformer weeds such as Lantana and Large-leaved Privet.</li> <li>Includes areas not part of the formal landscape plan but probably planted out or "enriched" with Australian native plantings as part of IBM rehabilitation works.</li> <li>Contains some locally-native trees and understorey plants that may have self-seeded.</li> </ul>									
4	а	Landscaped Gardens	Not natural ground	Planted mixed garden	Moderate to Low	<ul> <li>Locally native - provenance unknown.</li> <li>Contains some locally native trees and understorey plants that may have self-seeded.</li> <li>Primarily composed of trees over bare ground / leaf litter, trees over sparse shrubs, or trees over ground covers.</li> <li>Weed infestations relatively rare due to regular landscape maintenance.</li> </ul>									
5	а	BGHF	Natural ground	Regrowth forest	Very low	Highly modified post-1943 and / oor post-1961 regrowth forest.     Comprises some locally-native canopy trees over dense weed infestations, especially transformer weeds Lantana and Large-leaved Privet.     Vegetation integrity scores likely to be too low to warrant offsetting.     Likely to have been impacted by past works in accordance with infrastructure easements.									
5	b	BGHF	Natural ground	Regrowth forest	Moderate	<ul> <li>Even-aged natural regrowth forest with a simplified structure.</li> <li>Cleared for orchard in 1943 and while some woody regrowth is visible in 1970, the regrowth today may be post 1980s.</li> </ul>									
5	с	BGHF	Natural ground	Remnant / Old-regrowth forest	Good	<ul> <li>No evidence of past clearing from earliest available aerial photography (1943), however, given the early land grant history in this area, some or all is likely to have been cleared as early as the 1800s for farming.</li> </ul>									
6	а	STIF	Natural ground	Regrowth forest	Moderate	<ul> <li>Natural canopy over a simplified understorey due to past fire management regime (southern section), or mechanical removal of understorey for bushfire hazard control (western boundary).</li> </ul>									
6	b	STIF	Natural ground	Remnant / Old-regrowth forest	Good	<ul> <li>No evidence of past clearing from earliest available aerial photography (1943), however, given the early land grant history in this area, some or all is likely to have been cleared as early as the 1800s for farming.</li> </ul>									
Revision: A	Vegetation zone description	ons	Date: 04.02.20	Drawn by: A.M Ph: (02) 4368 11	06	Drawing name: Site address:									
				Approved by: E.A M: 0418 680 566	;	Vegetation Table Coonara Avenue,									
				Date: 04.02.2020 office@keystone	-ecological.com.au	Job number HISC 15-770 West Pennant Hills NSW									
$\vdash$				www.keystone-e	cological.com au	KEISIONE Drawing number: KE 002 Date: 04.02.2020 Bovision									
				ABN: 13 099 45	6 149	E C O L O G I C A L Drawing number. RC_002 estat endersed									

FIGURE 1b: Vegetation Zone descriptions.

# TABLE 2: Floristic data collected by Keystone Ecological in the 13 Rapid Data Points and in Cumberland State Forest by others, and their affinity to the candidate EECs.

Family	Scientific Name	Common Name	BGHF	STIF	RM	RDP 1	RDP 2	RDP 3	RDP 4	RDP 5	RDP 6	RDP 7	RDP 8	RDP 9	RDP 10	RDP 11	RDP 12 RDP 13	<b>Cumberland SF</b>
Acanthaceae	Pseuderanthemum variabile	Pastel Flower	С	С										x			х	
Adiantaceae	Adiantum aethiopicum	Common Maidenhair	С			x				х	x	x	х					
Adiantaceae	Cheilanthes distans	Bristly Cloak Fern																х
Adiantaceae	Cheilanthes sieberi subsp. sieberi	Poison Rock Fern																х
Apocynaceae	Parsonsia straminea	Common Silkpod				х					x	х	x	x	х		х	
Araliaceae	Hedera helix*	English Ivy							х							x		
Araliaceae	Polyscias sambucifolia subsp. long leaflets	Elderberry Panax		С		х		х		х				х				
Arecaceae	Livistona australis	Cabbage Tree Palm			х							x						
Asparagaceae	Asparagus aethiopicus*	Ground Asparagus					x					x					Х	
Asparagaceae	Asparagus scandens*	Asparagus															х	
Aspleniaceae	Asplenium australasicum	Birds Nest Fern							x									
Asteliaceae	Cordyline stricta	Narrow-leaf Palm Lily							x	x		x	х	x		x	х	
Asteraceae	Ozothamnus diosmifolius	Rive Flower			х									x				
Bignoniaceae	Pandorea jasminoides	Bower Vine			х													
Bignoniaceae	Pandorea pandorana	Wonga Vine	С	С		x				x	x	х	х	x	х	x	Х	
Blechnaceae	Blechnum cartilagineum	Gristle Fern	С		х													
Blechnaceae	Blechnum neohollandicum		С										х			x		
Caprifoliaceae	Lonicera japonica*	Japanese Honeysuckle					x											
Casuarinaceae	Allocasuarina littoralis	Black She-oak												х				
Casuarinaceae	Allocasuarina torulosa	Forest Oak	С	С		x			-									
Celastraceae	Denhamia silvestris	-	С							х		х			х			
Cunoniaceae	Ceratopetalum gummiferum	Christmas Bush			х													
Cyatheaceae	Cyathea australis	Rough Tree-fern			x													
Cyperaceae	Lepidosperma laterale	Variable Sword-sedge		С								х	х	x	х			
Dilleniaceae	Hibbertia dentata	Trailing Guinea Flower											х					
Ericaceae	Leucopogon juniperinus	Prickly Beard-heath	С	С		х					х	х		x	х			
Euphorbiaceae	Breynia oblongifolia	Coffee Bush	С	С	x	х						х		x	х		Х	Х
Euphorbiaceae	Glochidion ferdinandi var. ferdinandi	Cheese Tree	С				х			х	х	х		x	х	х	х	Х
Euphorbiaceae	Poranthera microphylla			С	х													х
Iridaceae	Dietes bicolor*	Spanish Iris			х													
Lamiaceae	Clerodendrum tomentosum	Hairy Clerodendrum	С	С							х	х						
Lauraceae	Cryptocarya glaucescens	Jackwood										х						
Lindsaeaceae	Lindsaea linearis	Screw Fern											x					
Lomandraceae	Lomandra filiformis												х	x				
Lomandraceae	Lomandra longifolia	Spiky-headed Mat-rush	С	С					х	х		х	х		х	х	х	
Lomariopsidaceae	Nephrolepis cordifolia	Fish-bone Fern							х									
Luzuriagaceae	Eustrephus latifolius	Wombat Berry	С		х	х						х		х	x	х	x	
Malvaceae	Brachychiton populneus	Kurrajong															X	
Menispermiaceae	Sarcopetalum harveyanum	Pearl Vine								х			х				X	
Menispermiaceae	Stephania japonica var. discolor	Snake Vine						х							x		x	
Mimosaceae	Acacia elata	Cedar Wattle					х											

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Mimosaceae	Acacia floribunda	Sally Wattle			x														
Mimosaceae	Acacia longissima	Long-leaf Wattle				x							x						
Moraceae	Ficus coronata	Sandpaper Fig	С		х											x			
Musaceae	Musa sp.*	Banana																х	
Myrsinaceae	Myrsine variabilis	Muttonwood	С			x													
Myrtaceae	Angophora costata	Smooth-barked Apple	C	С		x			x	x	x	Х	x	х				х	
Myrtaceae	Corymbia citriodora*	Lemon-scented Gum			х														
Myrtaceae	Eucalyptus paniculata subsp. paniculata	Grey Ironbark	С	С			х												
Myrtaceae	Eucalyptus pilularis	Blackbutt	С			x			x	x	x	х	x	х	х	х		х	х
Myrtaceae	Eucalyptus punctata	Grey Gum			х														
Myrtaceae	Eucalyptus resinifera subsp. resinifera	Red Mahogany										х							х
Myrtaceae	Eucalyptus saligna	Sydney Blue Gum	С				х	x	x	nearby					х	х	x	х	х
Myrtaceae	Eucalyptus tereticornis	Forest Red Gum			х														х
Myrtaceae	Leptospermum polygalifolium subsp. polygalifolium	Lemon Scented Tea Tree																	х
Myrtaceae	Leptospermum trinervium	Flaky-barked Tea Tree																	х
Myrtaceae	Syncarpia glomulifera	Turpentine		С		x				x	x	Х	x		х	х		х	х
Ochnaceae	Ochna serrulata*	Mickey Mouse Plant				x	х												х
Oleaceae	Ligustrum lucidum*	Large-leaved Privet					х	x	x			х				х	х	х	х
Oleaceae	Ligustrum sinense*	Small-leaved Privet					х			х	x	х			х	х	х		х
Oleaceae	Notelaea longifolia	Mock Olive	С	С		x					x	х		х					х
Oleaceae	Olea europaea subsp. cuspidata*	African Olive			х													х	
Orchidaceae	Acianthus sp.	Orchid			х														Х
Orchidaceae	Calochilus campestris	Copper Beard Orchid																	Х
Orchidaceae	Calochilus paludosus	Red Beard Orchid																	х
Orchidaceae	Calochilus robertsonii	Purplish Beard Orchid																	Х
Orchidaceae	Cryptostylis subulata	Large Tongue Orchid									x								
Orchidaceae	Dipodium variegatum				x														
Orchidaceae	Microtis unifolia	Common Onion Orchid																	Х
Oxalidaceae	Oxalis perennans	-																	Х
Oxalidaceae	Oxalis pes-caprae*	Soursob																	Х
Passifloraceae	Passiflora edulis*	Common Passionfruit																	х
Passifloraceae	Passiflora herbertiana	Native Passionfruit												х				х	Х
Passifloraceae	Passiflora subpeltata*	White Passionflower																	х
Passifloraceae	Passiflora tarminiana*	Banana Passionfruit						x											
Phormiaceae	Dianella caerulea	Flax Lily	С	С		x				x	x							х	Х
Phormiaceae	Dianella caerulea var. producta	Blue Flax Lily																	х
Phormiaceae	Dianella longifolia	-																	х
Phormiaceae	Dianella prunina	-										Х	x	х					Х
Phormiaceae	Dianella revoluta var. revoluta	Spreading Flax Lily																	х
Phytolaccaceae	Phytolacca octandra*	Inkweed																	х
Pittosporaceae	Billardiera scandens	Hairy Apple Berry																	х
Pittosporaceae	Bursaria spinosa var. spinosa	Blackthorn		С		х					x								х
Pittosporaceae	Pittosporum revolutum	Yellow Pittosporum											x	х	х			х	х

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Pittosporaceae	Pittosporum undulatum	Sweet Pittosporum	С	С		x	x	x	x	x	x	x	x	x	x		x	x	x
Plantaginaceae	Plantago debilis	Slender Plantain																	x
Plantaginaceae	Plantago lanceolata*	Ribwort																	х
Plantaginaceae	Veronica plebeia	Creeping Speedwell																	х
Poaceae	Andropogon virginicus*	Whisky Grass																	х
Poaceae	Aristida vagans	Three-awn Speargrass																	х
Poaceae	Briza maxima*	Quaking Grass																	х
Poaceae	Briza minor*	Shivery Grass																	х
Poaceae	Briza subaristata*	-																	х
Poaceae	Bromus catharticus*	Prairie Grass																	х
Poaceae	Dichelachne micrantha	Short-hair Plume Grass																	х
Poaceae	Dichelachne rara	-																	х
Poaceae	Digitaria parviflora	Small-flowered Finger Grass																	х
Poaceae	Echinopogon caespitosus var. caespitosus	Tufted Hedgehog Grass																	х
Poaceae	Echinopogon ovatus	Forest Hedgehog Grass																	х
Poaceae	Ehrharta erecta*	Panic Veldtgrass						x											х
Poaceae	Entolasia marginata	Bordered Panic	C	C		x			x			x	х		х		х	х	х
Poaceae	Entolasia stricta	Wiry Panic												x					х
Poaceae	Imperata cylindrica var. major	Blady Grass																	х
Poaceae	Microlaena stipoides var. stipoides	Weeping Rice Grass		С	х														х
Poaceae	Oplismenus aemulus	Basket Grass	С	С	х										х				х
Poaceae	Oplismenus aemulus		С	С											х				
Poaceae	Oplismenus imbecillis	-																	х
Poaceae	Paspalidium sp.	-																	х
Poaceae	Poa affinis	-																	х
Poaceae	Poa labillardieri var. labillardieri	Tussock Grass																	х
Poaceae	Sporobolus africanus*	Parramatta Grass																	х
Poaceae	Themeda triandra	Kangaroo Grass		C	х								х	х					х
Podocarpaceae	Podocarpus spinulosus	-																	х
Polygalaceae	Comesperma ericinum	Matchheads																	х
Polypodiaceae	Platycerium superbum	Staghorn										х							
Proteaceae	Grevillea linearifolia	White Spider Flower																	х
Proteaceae	Grevillea sericea	Pink Spider Flower																	х
Proteaceae	Hakea laevipes subsp. laevipes	-																	х
Proteaceae	Hakea salicifolia	Willow Hakea																	х
Proteaceae	Hakea sericea	Needlebush																	х
Proteaceae	Isopogon anemonifolius	Flat-leaved Drumsticks																	х
Proteaceae	Lomatia silaifolia	Crinkle Bush				х							x	x					х
Proteaceae	Macadamia integrifolia*	Macadamia Nut																	х
Proteaceae	Persoonia laurina	Laurel Geebung																	X
Proteaceae	Persoonia levis	Broad-leaved Geebung																	x
Proteaceae	Persoonia linearis	Narrow-leaved Geebung	С		х														
Proteaceae	Petrophile pulchella	Conesticks																	x

Family	Scientific Name	Common Name	BGHF	STIF	RM	RDP 1	RDP 2	RDP 3	RDP 4	RDP 5	RDP 6	RDP 7	RDP 8	RDP 9	RDP 10	RDP 11	RDP 12	RDP 13	Cumberland SF
Proteaceae	Telopea speciosissima	Waratah																	Х
Proteaceae	Xylomelum pyriforme	Woody Pear																	Х
Pteridaceae	Pteris tremula	Tender Brake																	х
Ranunculaceae	Clematis aristata	Old Man's Beard	C	С		x		X			x	x			x				Х
Ranunculaceae	Clematis glycinoides var. glycinoides	Clematis										х						х	х
Rhamnaceae	Alphitonia excelsa	Red Ash	C			х									х			х	х
Rhamnaceae	Cryptandra amara	-																	х
Rhamnaceae	Cryptandra ericoides	-																	х
Rhamnaceae	Pomaderris intermedia											х						х	
Rosaceae	Rubus fruticosis sp. agg.*	Blackberry										х							х
Rosaceae	Rubus parvifolius	Native Raspberry																	Х
Rubiaceae	Galium binifolium	-																	х
Rubiaceae	Galium propinquum	Bedstraw																	х
Rubiaceae	Morinda jasminoides	-	C			х		x	x	x	х	x	x		х	х	х	х	Х
Rubiaceae	Opercularia aspera	Common Stinkweed						· · ·											х
Rubiaceae	Pomax umbellata	Pomax																	х
Rutaceae	Eriostemon australasius subsp. australasius	Pink Wax Flower																	х
Rutaceae	Zieria smithii	Sandfly Zieria		С	х									х	х				х
Santalaceae	Exocarpos cupressiformis	Native Cherry																	х
Sapindaceae	Dodonaea triquetra	Hop Bush												х					Х
Schizaeaceae	Schizaea bifida	Forked Comb-fern																	х
Smilacaceae	Smilax australis	Lawyer Vine										x	x						х
Smilacaceae	Smilax glyciphylla	Sarsparilla	C	C						x									Х
Solanaceae	Duboisia myoporoides	Corkwood			х														Х
Solanaceae	Solanum mauritianum*	Wild Tobacco Bush			x													х	
Solanaceae	Solanum prinophyllum	Forest Nightshade																	х
Solanaceae	Solanum pseudocapsicum*	-																	Х
Solanaceae	Solanum seaforthianum*	Brazilian Nightshade						x											
Thelypteridaceae	Christella dentata	-			x											х			Х
Thymelaeaceae	Pimelea linifolia subsp. linifolia	Slender Rice Flower																	Х
Ulmaceae	Trema tomentosa var. aspera	Native Peach																	х
Verbenaceae	Lantana camara*	Lantana					x	x		x	x	x		х					
Verbenaceae	Verbena officinalis*	Common Verbena																	х
Vitaceae	Cayratia clematidea	Slender Grape					х											х	х
Xanthorrhoeaceae	Xanthorrhoea media	-				х													

### 2. Flora Survey

EES notes that it is preferable to carry out detailed survey for all relevant threatened flora species as early as possible in the planning process. This concept is not contested, but the potential for the three subject flora species to occur within the identified developable areas in this Planning Proposal is considered to be negligible to zero. The available habitats in the proposed development areas are almost entirely made up of highly modified landscaped gardens that are continually disturbed and therefore not suitable. The wilder parts of the proposed development areas are dominated by infestations of transformer weeds such as Lantana and Privet, and are also considered unsuitable.

Therefore, I maintain that the survey effort underpinning the Planning Proposal was sufficient for these species, as its focus was to provide certainty that the development zones were located so that biodiversity impacts were avoided and minimised by being in the areas of least ecological value.

Notwithstanding that opinion, floristic survey has now been undertaken across all habitats on site, and in seasons suitable to detect each of the 3 species:

• **Epacris purpurascens var. purpurascens** – flowers are needed to reliably separate this species from the similar *Epacris pulchella*, and peak flowering occurs in September to October. However, it flowers sporadically at other times of the year and may be detectable in seasons other than spring if conditions are suitable.

General site assessment has been undertaken in September (2015, 2017) and October (2019), along with targeted floristic surveys in summer (2017, 2018), autumn (2018, 2019), and winter (2019).

No *Epacris* species have been found anywhere on site. This species is considered most likely to occur, if at all, in the least disturbed remnants and where the soils are transitional between shale and sandstone.

• *Pimelea curviflora* var. *curviflora* – flowers and are needed to separate this species from the other locally-occurring varieties of this species, and it flowers from October to March. Suitable survey has occurred in December 2017, February 2018, March 2018, December 2018, January 2019, and October 2019.

This species has not been detected on site, with the common *Pimelea linifolia* the only *Pimelea* species observed. It is considered most likely to occur, if at all, in the least disturbed remnant STIF.

• *Syzygium paniculatum* - fruit is needed to positively separate this species from other *Syzygium* species, and survey needs to occur from April to June when it is in fruit. General site assessment has been undertaken in June (2014), along with targeted floristic surveys June (2018, 2019), and May (2019).

No Syzygium species have been located outside of the landscaped gardens, with a

number of individuals identified during the arboricultural assessment within the gardens near the entrance foyer.

The National Recovery Plan for this species states unequivocally that planted specimens are not considered to play a role in the conservation of the species as their provenance is unknown. They are very common in horticulture, and occur outside of both their natural geographic range and natural ecological range. Their presence in the landscaped gardens play no part in the impact assessment process.

This species is considered most likely to occur naturally, if at all, in the in the moister gullies of the least disturbed old regrowth / remnant BGHF.

In my opinion, the potential for the species to occur in the retained bushland areas is immaterial to the Planning Proposal, although it must be incorporated into conservation management plans.

# 3. Powerful Owl

• The local population calculation proposed by EES is not an unreasonable definition, and it may alter the assumed size of the local population from 16 pairs to 12 pairs (plus offspring and floaters). Irrespective of the methodology taken to calculate the population size, the conclusion drawn regarding the potential impact of development enabled by the Planning Proposal remains the same. In my opinion, the potential impacts to the breeding and roosting habitat of this species are adequately avoided and minimised by the proposal, with adequate buffers maintained to known past breeding sites.

If the worst-case scenario was to eventuate – the loss of the resident pair – this will not result in a viable local population of the species being placed at risk of extinction, even if that population was determined to be 12 pairs and not 16. The most likely outcomes are the expansion of the territories of neighbouring birds into the vacated territory (therefore a reduction of 1 pair), or the establishment of a new pair in the vacated territory (no change to the population size). However, I emphasise that I do not believe that the resident pair will abandon the habitat on site, as they are accustomed to the circumstances of an urban forest and displayed resilience with continued breeding across their territory.

• There seems to be a misunderstanding regarding the proposed timing of construction. It is intended that appropriate controls are placed on works that have the greatest potential to disrupt the breeding of the Powerful Owl. Such controls are properly applied (and regularly applied elsewhere) as part of Consent Conditions for any subsequent Development Application, and need not prevent the acceptance of the Planning Proposal. Such conditions could restrict noisy construction activity nearest the nest trees to those periods outside of the usual breeding season and outside of their daily active times.

- EES expresses concern regarding "amplified noise" in the recreational areas disrupting breeding of the Powerful Owl. The Planning Proposal does not include such detail, it simply sets the land zonings applicable across the site. Appropriate controls regarding noise that is considered to have the potential to disrupt breeding can be part of the Conditions of Consent and included in any operational plan for the recreation areas.
- EES is concerned that the potential impacts of the proposed soccer field (particularly lighting and synthetic turf) have not been taken into account.

The Planning Proposal does not put forward any more than the construction of the field, and it does not include lighting.

The synthetic turf surface is a specification of Council, and is currently contained in the draft VPA. At a presentation to a recent Ecological Consultants Association conference, Dr Beth Mott from BirdLife Australia spoke of the potential for works adjacent to roosting habitat to change the microclimate provided by the dense gully vegetation. As synthetic turf is hotter than grass, this is a legitimate potential impact that needs to be considered.

However, the degree of heating contributed by a single field to the surrounding air is considered to be negligible. Research into such systems has demonstrated that the air temperature above artificial turf was likely to be only 1.8°C greater than that over grass.<sup>1</sup> Such a small difference in the temperature of the air column directly above the synthetic turf would be quickly ameliorated by air movement and the presence of the surrounding buffering forest vegetation. Given that the proposed soccer field is over 60 metres from the nearest roosting habitat, any small localised change in air temperature is not considered likely to pervade into the shaded gully.

In my opinion, the presence of synthetic turf in this circumstance is unlikely to result in adverse impacts to nearby Powerful Owl habitat.

Notwithstanding this opinion, the soccer field will need to go through a DA process where any such potential impacts of the playing surface will be formally assessed. Controls to be applied to the operation of the field are more properly addressed at the DA stage, with potential impacts ameliorated as part of the Conditions of Consent. Many ameliorative strategies are available to decrease the anticipated heat load, and include such things as the materials used, watering of the pitch, and additional shading.

• The required buffer distance for nest tree number 2 will be maintained by the Planning Proposal, and the intervening land use between the tree and the housing is proposed to be retained forest. This will continue to provide a physical buffer to disturbances (e.g. noise and lights) that may emanate from the development.

<sup>&</sup>lt;sup>1</sup> See Yaghoobian, N., Kleissl, J., and Krayenhoff, E.S. (2010) Modeling the Thermal Effects of Artificial Turf on the Urban Environment. *Journal of Applied Meteorology and Climatology* 49:332-345.

It is important to note that the resident Powerful Owls are already habituated to existing noise-generating activities in the urban and forested environment within which they currently successfully roost, breed, and forage. These include traffic sounds, airplane noise, nearby construction activity (e.g. roadworks, demolition of old houses, building of the metro rail line), noise from existing neighbouring residences (e.g. mowing, outdoor pool parties, music), forest management activities in Cumberland State Forest (e.g. tree felling), large number of visitors and vehicle movements associated with the café and nursery in Cumberland State Forest, and noise from the large numbers of visitors (mainly children) to the Tree Top Adventure Park, including its outdoor party space, in Cumberland State Forest. Note that despite all of these noise-generating activities, the resident pair of Powerful Owls were most recently detected breeding in a gully in Cumberland State Forest near the Adventure Park.

Similarly, lights are already part of the natural environment of this successfully breeding pair of Powerful Owls. Photograph 1 shows the existing lights that emanate from the IBM building and the existing street lights near nest tree number 2. These conditions were in place when this tree was being used by the resident pair.



PHOTOGRAPH 1: IBM office building and existing street lighting, 4<sup>th</sup> December 2018, taken from roadway adjacent to nest tree number 2.

The Forestry Corporation buildings near the breeding habitat used in the most recent breeding seasons in Cumberland State Forest are even more brightly lit – see Photograph 2.



PHOTOGRAPH 2: Forestry Corporation office buildings,18<sup>th</sup> July 2019, taken from adjacent gully.

# 4. Fencing

EES recommends fencing of the entire bushland reserve, although this has the potential to interrupt the movement of wildlife and is without precedent in other similar bushland areas in Sydney. Therefore, it is proposed that any future fencing is of a design that does not prevent movement of terrestrial animals. Such detail is properly the subject of Conditions of Consent for any future Development Application and / or part of the management arrangements for the reserved bushland. This issue is not relevant to the consideration of the Planning Proposal.

# 5. Pathways and walking trails

EES recommends that the existing pathways and trails through the site should be rationalised in order to restrict the movement of people through the reserved bushland. This detail is appropriate to the management arrangements for the reserved bushland. This issue is not relevant to the consideration of the Planning Proposal.

#### 6. Control of Cats and Dogs

Regulation of dog and cat ownership in new developments is an increasingly common and successful feature of Consent Conditions, strata arrangements, and operational management plans where there is the potential for conflict with native animals. This will not replace other ameliorative measures (e.g. traffic calming devices or appropriate fencing). In the absence of the Planning Proposal, there are no easily enforceable controls on the use of the site by locals for exercising dogs off leash. It is also noted that feral animal control should be rightfully part of the conservation management of the reserved bushland. We note also that Council's draft DCP already includes such restrictions.

# 7. Use of local species

The original submission from the NSW Office of Environment and Heritage proposed that the DCP be amended to require the planting of local native species. The draft DCP prepared by Council incorporated the requirement for landscaping to include the use of local native species.

I trust that this information is of assistance. Please do not hesitate to contact me if you require further information or clarification.

Clizubeth lisha

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