Attachment 2
to
Item 2.1.1

Ecological Constraints Assessment - 745 Old Pitt Town Road, Oakville

Date of meeting: 20 July 2023
Location: By audio-visual link
Time: 10:00 a.m.

14 July 2021

Frank and Lisa Gatt
c/o- Chris Ross
SLR Consulting Australia Pty Ltd
Suite 2B, 125 Bull Street
Newcastle West, 2302

Dear Chris

Re: Ecological constraints assessment for 745 Old Pitt Town Road, Oakville

Project no. 31574

Biosis Pty Ltd was commissioned by SD Architects to complete an ecological constraints assessment to describe the biodiversity values and constraints associated with the proposed construction of a Service Station, and application for a change of land use, 745 Old Pitt Town Road, Oakville New South Wales (NSW) (the study area).

The study area covers approximately 0.6 hectares within part Lot 11 DP 1157046, Old Pitt Town Road. The study area is currently zoned 'RU4 Primary Production Small Lots' under the *Hawkesbury Local Environment Plan 2012* (LEP) and contains a concrete driveway, septic tanks and remnant vegetation. Biosis previously provided the ecological constraints report to SD Architects and understands that SLR has taken over the project and is now moving forward with the planning proposal.

The objective of this flora and fauna constraints assessment is to determine the presence of any threatened flora, fauna, populations or ecological communities (biota) within the study area and, where applicable, assess the potential impacts of the project on any such species or their habitats, listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and NSW *Biodiversity Conservation Act 2016* (BC Act).

Background

The study area is approximately 0.55 hectares and is defined as the southeast portion of Lot 11 DP 1157046, bounded to the south by Old Pitt Town Road and to the east by Boundary Road, Oakville NSW (Appendix 1, Figure 1). The surrounding land use is formed of vegetated peri-urban lots dedicated to small hold farms and single residences to the north-west, west, south-west and east with predominantly cleared rural lots devoted to primary production to the northeast.

The study area is within Hawkesbury City Council Local Government Area (LGA) and is zoned RU4 – Primary Production Small Lots under the *Hawkesbury Local Environmental Plan 2012* (LEP). In addition, the study area is mapped as facilitating connectivity, containing significant vegetation and Class 5 Acid Sulfate Soils (ASS) under the LEP.

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The minimum lot size is for the study area is 2 hectares, therefore the clearing threshold under the BC Act is 0.5 hectares. The study area is located within the Biodiversity Values Map (BV Map) (EES 2020a).

The study area is within the Hawkesbury Council LGA, listed in Schedule 1 of *State Environmental Protection Policy* (SEPP) (*Koala Habitat Protection) 2021* and is subject to SEPP *(Vegetation in Non-rural Areas) 2017* (Vegetation SEPP). The study area contains Vegetation Category 3 bushfire prone vegetation on the Bush Fire Prone Land Map (Hawkesbury 2018).

Method

Database and literature review

Prior to completing the field investigation, information provided by SD Architects as well as other key information was reviewed, including:

- Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Environment, Energy and Science (EES) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- NSW DPI WeedWise database for *Biosecurity Act 2015* (Biosecurity Act) listed priority weeds for the Greater Sydney Local Land Services (LLS) area within the Hawkesbury City LGA.
- Relevant vegetation mapping including:
  - *Remnant Vegetation of the western Cumberland subregion, 2013 Update* VIS_ID 4207 (DPIE 2015).
- NSW Department of Planning, Industry and Environment (DPIE) ePlanning Spatial Viewer to review relevant State and Local Government legislative requirements and planning provisions.

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016* (BC Act).
- *Biosecurity Act 2015* (Biosecurity Act).
- SEPP (Vegetation in Non-Rural Areas) 2017.
- SEPP (Koala Habitat Protection) 2019.
- *Hawkesbury LEP.*
- *Hawkesbury Development Control Plan 2002* (Amended).

Field investigation

A field investigation of the study area was undertaken on 22 June 2020 by Nicola Trulock (Consultant Botanist) of Biosis. Vegetation within the study area was surveyed using the NSW Biodiversity Assessment Method (BAM) (OEH 2017) and random meander technique (Cropper 1993) over three person hours.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type, with vegetation type the finest grouping. The grouping referred to in this report is Plant

Community Type (PCT) as defined by the Biodiversity Assessment Method (BAM) (OEH 2017), and has been the standard used across NSW since 2016.

The vegetation types, within the study area, were stratified into PCTs broadly based on previous vegetation mapping, and the vegetation boundaries marked with a hand-held GPS in the field. Appropriate PCTs were selected on the basis of species composition and structure, known geographical distribution, landscape position, underlying geology, soil type, and any other diagnostic features.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (EES 2020) or predicted to occur (DAWE 2020) within 5 kilometres. This list was filtered according to species descriptions, life history, habitat preference and soil preference to determine those species most likely to be present within the study area.

Targeted searches were undertaken for Cumberland Plain Land Snail and Koala. Searches involved undertaking a modified Spot Assessment Technique (SAT) methodology to detect Koala scat under each tree within the subject land. The SAT methodology was modified to include searches under all trees within the subject land as the subject land does not contain the required number of trees (30 individuals) used for standardised SAT grid surveys. Thorough searching for Cumberland Plain Lands Snail at the base of all trees within the subject land was taken concurrently.

Results

Regional soil landscape mapping indicates that the study area occurs within the Blacktown Residual soil landscape as per the *Soil Landscapes of the Penrith 1:100 000 Sheet* (Bannerman and Hazleton 1990). The Blacktown Residual soil landscape is characterised by gently undulating rises (>5%) over Wianamatta Group and Hawkesbury shales with local relief of 30 metres. Soils are shallow to moderately deep and comprise red and brown podzolic soils on crests, upper slopes and well-drained areas and yellow podzolic soils and soloths on lower slopes and poorly drained areas. The soil quality is known to exhibit low fertility, poor drainage and is not susceptible to erosion. Vegetation associated with this soil landscape consists of wet and dry sclerophyll forests in areas exposed to moderate to high rainfall and grassy woodlands in areas exposed to moderate to low rainfall.

The study area supports highly disturbed patches of remnant native vegetation and cleared exotic dominated pasture. The study area has a moderate cover of opportunistic woody weeds consisting of woody weeds, herbaceous annuals and perennial exotic grasses. Prior disturbance is directly related to historical clearing of vegetation and current use as pastoral land for a small population of domesticated sheep *Ovis aries*.

These disturbances have resulted in altered structural integrity and domination of exotic species within patches of remnant vegetation along the southern and eastern boundaries of the study area. No hollow-bearing trees were recorded in the study area during the current investigation.

Fauna species observed utilising the study area predominantly consist of generalist avifauna able to adapt and persist within the habitats present in a peri-urban-rural matrix such as Australian Magpie *Cracticus tibicen*, Magpie-Lark *Grallina cyanoleuca* and Noisy Miner *Manorina melanocephala*.

Vegetation communities

Prior to the field investigation, Biosis confirmed that the following native vegetation communities have been mapped in the broader landscape (DPIE 2015), these include:

- PCT 849: *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion* which forms a component of *Cumberland Plain Woodland in the Sydney Basin Bioregion*

(Critically Endangered Ecological Community [CEEC], EPBC Act and BC Act). Henceforth referred to as Cumberland Plain Woodland CEEC.

- PCT 1395: *Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion* which forms *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* (CEEC, EPBC Act and BC Act).

A key focus of the field investigation was to assess the vegetation of the study area against the final determinations for the above listed CEECs to determine presence or absence.

The vegetation of the study area comprises two vegetation communities (Appendix 1, Figure 1). The structure, floristic composition and condition of these communities are described in Table 1. A list of flora and fauna recorded within the study area are provided in Appendix 3 and Appendix 4.

Table 1 Vegetation Communities within the study area

Estuarine Saltmarsh	
PCT	PCT 849: *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.*
Extent within study area	Approximately 0.11 ha of Cumberland Plain Woodland CEEC (PCT 849) meeting the BC Act listing criteria occurs along the southern and eastern boundaries of the study area.
Community Description	Cumberland Plain Woodland EEC within the study area consists of a thinned canopy of remnant Eucalyptus over a highly degraded understorey of grazed grasses and herbs. Canopy trees include Grey Box *Eucalyptus moluccana* and Narrow-leaved Ironbark *Eucalyptus crebra.* Ground covers include Common Cotula *Cotula australis,* Climbing Saltbush *Einadia nutans* subsp. *nutans, Einadia nutans* subsp. *linifolia,* Slender Flat-sedge *Cyperus gracilis* and *Plantago varia.* Exotic species dominate the understorey, consisting of African Lovegrass *Eragrostis curviflora,* Bindyi *Soliva sessilis,* Common Sowthistle *Sonchus oleraceus,* Spear Thistle *Cirsium vulgare,* Paddy's Lucerne *Sida rhombifolia,* Crowsfoot Grass *Eleusine indica*, Shepherds Purse *Capsella bursa-pastoris, Solanum sisymbriifolium* and Lamb's Tongues *Plantago lanceolata.*
Condition	Cumberland Plain Woodland CEEC (PCT 849) in the study area is in low condition due to altered structural integrity, low native species diversity and moderate levels of weed incursion resulting from historical vegetation clearing and pastoral grazing.
Associated soils, rainfall and landscape position	Cumberland Plain Woodland CEEC (PCT 849) distribution is restricted to the Cumberland Plain IBRA subregion on clay soils derived from Wianamatta Group geology. This community occurs on flat to hilly undulating terrain at elevations up to 350 m above sea level (asl) with typical average annual rainfall of 700-900 mm.
Threatened ecological community	**Commonwealth EPBC Act:** Does not meet listing criteria. **Justification:** Cumberland Plain Woodland CEEC does not meet the listing criteria under the EPBC Act as the native understorey cover is <30%. **NSW BC Act:** CEEC **Justification:** Cumberland Plain Woodland CEEC in the study area is consistent with BC Act listing criteria based on IBRA subregion (Cumberland Plain), terrain (undulating), elevation (58-61 m asl), rainfall (701.4 mm), indicative species (eight species), dominant canopy (Grey Box and Narrow-leaved Ironbark), and evidence of a partially intact seedbank.
Picture: Cumberland Plain Woodland CEEC in the study area	

Exotic Pasture	
PCT	N/A
Extent within study area	Approximately 0.37 ha of Exotic Pasture occurs throughout the remainder of the of the study area.
Community Description	Exotic Pasture within the study area consists of a highly degraded understorey of grazed grasses and herbs. Ground covers include Common Cotula, Climbing Saltbush, *Einadia nutans* subsp. *linifolia,* Slender Flat-sedge and *Plantago varia.* Exotic species dominate the understorey, consisting of African Lovegrass, Bindyi, Kikuyu *cenchrus clandestinus,* Common Sowthistle, Spear Thistle, Paddy's Lucerne, Crowsfoot Grass, Shepherds Purse, *Solanum sisymbriifolium* and Lamb's Tongues.
Condition	Exotic Pasture in the study area is in low condition due to altered structural integrity, low native species diversity, high levels of weed incursion and high disturbance resulting from historical vegetation clearing and pastoral grazing.
Associated soils, rainfall and landscape position	Exotic Pasture distribution is associated with land which has undergone historical vegetation clearing and pasture improvement for the grazing of either cattle or sheep.
Threatened ecological community	**Commonwealth EPBC Act:** Does not form a PCT protected under the EPBC Act. **Justification:** N/A. **NSW BC Act:** Does not form a PCT protected under the BC Act. **Justification:** N/A.
Picture: Native Pasture in the study area	

Priority weeds

No priority weeds for the Greater Sydney LLS region (DPI 2020a), which includes the Hawkesbury City Council LGA, have been recorded in the study area.

Threatened species

Background searches identified 24 threatened flora species and 53 threatened fauna species recorded (EES 2020) or predicted to occur (DAWE 2020) within 5 kilometres of the study area. Those species considered most likely to have habitat within the study area based on the background research are as follows:

Flora

- Downy Wattle *Acacia pubescens* (Vulnerable, EPBC Act and BC Act).
- *Dillwynia tenuifolia* (Vulnerable, BC Act).
- Juniper-leaved Grevillea *Grevillea juniperina* subsp. *juniperina* (Vulnerable, BC Act).
- *Pultenaea parviflora* (Vulnerable, EPBC Act and Endangered, BC Act).

Fauna

- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable EPBC, Act and BC Act).
- Little Lorikeet *Glossopsitta pusilla* (Vulnerable, BC Act).
- Swift Parrot *Lathamus discolour* (Critically Endangered, EPBC Act Endangered, BC Act)
- Large Bentwing-bat *Miniopterus orianae oceanensis* (Vulnerable, BC Act).
- Little Bentwing-bat *Miniopterus australis* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii (*Vulnerable, BC Act).
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act).
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act).
- Southern Myotis *Myotis macropus* (Vulnerable, BC Act).
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* (Vulnerable, BC Act).

An assessment of the habitat values of the study area is provided in Table 2 for threatened flora species and in the paragraphs below for threatened fauna species.

Table 2 Assessment of habitat for threatened flora species

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
Downy Wattle	Has been recorded on 31 previous occasions within the locality with closest record approximately 0.8 km from the study area. Downy Wattle is associated with Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain woodland on sandstone, alluvium and gravely soils.	Habitat features which form a requirement for this species are partially present within the study area (Cumberland Plain Woodland EEC only). The field investigation was within the relevant survey period for Downy Wattle (all year) and subsequent field survey did not detect the species.
Dillwynia tenuifolia	Has been recorded on 26 previous occasions within the locality with closest record approximately 2.2 km from the study area. *Dillwynia tenuifolia* is a low spreading shrub which is associated with Cooks River/Castlereagh Ironbark Forest, Castlereagh Scribbly Gum Woodland, Shale/Gravel Transition Forest and Sydney Hinterland Dry Sclerophyll Forests on tertiary alluvium, laterised clay and shale-sandstone transition soils.	The habitat requirements of this species are not present in the study area. The field investigation occurred outside the survey period for *Dillwynia tenuifolia* (Aug-Oct); however, the foliage and habit of this species is distinctive and readily detectable outside the flowering period. The field survey did not record any shrubs, or this species, within the study area.

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
Juniper-leaved Grevillea	Has been recorded on 24 previous occasions within the locality with closest record approximately 3.4 km from the study area. Juniper-leaved Grevillea is a medium sized shrub endemic to the western Sydney region with a population spanning from Blacktown to Pitt Town. This species occurs at elevations <50 m in Cooks River/Castlereagh Ironbark Forest, Castlereagh Scribbly Gum Woodland, Shale/Gravel Transition Forest and Cumberland Plain Woodland on sandy to clay loam soils, tertiary alluviam and red pseudolateritic gravels.	The habitat requirements of this species are present in the study area (location, Cumberland Plain Woodland EEC, clay loam soils). The field investigation occurred during the survey period for Juniper-leaved Grevillea (all year). The field survey did not record any shrubs, or this species, within the study area.
Pultenaea parviflora	Has been recorded on 29 previous occasions within the locality with closest record approximately 2.2 km from the study area. *Pultenaea parviflora* is a small sized shrub endemic to the western Sydney region with a population spanning from Kemps Creek to Wilberforce. This species occurs in Cumberland Dry Sclerophyll Forests in soils derived from Wianamatta shale, laterite or alluvium.	Habitat requirements of this species are partially present within the study area (soils derived from Wianamatta shale). The field investigation occurred outside the survey period for *Pultenaea parviflora* (Sept – Nov); however, the foliage and habitat of this species is distinctive and readily detectable outside of the flowering period. The field investigation did not detect any shrubs, or this species, within the study area.

Based on the size of the study area, the survey effort is considered comprehensive for the flora species outlined in Table 2. Taking all of these factors into consideration, there is a low likelihood of occurrence for the above listed species.

Fauna habitat within the study area is limited to open exotic pasture and small remnant patches of Cumberland Plain Woodland. The above mentioned fauna species are considered likely to occur on occasion during dispersal, migration or foraging. One hollow-bearing tree provides a hollow suitable for nesting by Little Lorikeet or may provide potential roosting for threatened microbats and is considered to be a moderate constraint. No Grey-headed Flying-fox camps or evidence of a camp occur within the study area, the nearest camp is located approximately 24 kilometres to the west at Yarramundi.

Based on the size of the study area, the survey effort is considered comprehensive to assess habitat presence for threatened microbats, Grey-headed Flying-fox and nectivorous bird species. Survey effort for Koala and Cumberland Plain Land Snail is sufficient to determine presence of these species. Taking all of these factors into consideration, there is a low likelihood of impact for the above listed nomadic species.

Riparian corridors

No waterways were identified within the study area. Man-made dams were identified on surrounding lots only.

SEPP (Koala Habitat Protection) 2021

State Environment Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP) applies to local government areas within the Sydney metropolitan area and the Central Coast, listed in Schedule 1 of the Koala SEPP. The study area covers an area of 0.6 hectares located on land zoned 'RU4 Primary Production Small' Lots within the Hawkesbury Local Government Area (LGA), listed on Schedule 1 of the Koala SEPP and does not occur

within the area of an approved koala plan of management. In accordance with Part 2 clause 11, the Koala SEPP applies to land of at least 1 hectare (including adjoining land within the same ownership), therefore SEPP (Koala Habitat Protection) 2021 does not apply to the project.

Constraints assessment

The ecological constraints within the study area are provided in Appendix 1 Figure 1. These constraints are ranked as high, moderate or low, based on the criteria outlined in Table 3.

Table 3: Ecological constraints in the study area

Constraint	Value	Justification	Recommendations
High	• Low condition Cumberland Plain Woodland, listed under the BC Act. • Areas mapped on the Biodiversity Values mapping. •	• Vegetation communities listed as critically endangered under BC Act. • The patches are remnant within the study area and larger patches occur in adjacent lots. • Searches did not detect Cumberland Plain Land Snail. • Potential foraging for threatened species. • Potential habitat for threatened flora species.	• Impact to these areas should be avoided where feasibly possible. • Impacts to Cumberland Plain Woodland listed under the BC Act, >0.5 hectares must be offset. • Application to refine the Biodiversity Values mapping to remove areas of exotic pasture.
Low	• Exotic pasture. • Hollow-bearing tree.	• Does not form part of an ecological community • Does not contain any hollows suitable for fauna residency (basal hollow). • Is unlikely to provide potential habitat for threatened flora or fauna.	• Development suitable in these areas.

Conclusion and recommendations

The current proposal indicates that up to 0.11 hectares of Cumberland Plain Woodland CEEC meeting BC Act listing criteria and highlighted on the BV Map (Appendix 5).

In this case, where the planning proposal is seeking to alter the land use, the BC Act requires the assumption of total clearance of the land. Any impacts to land mapped as biodiversity values will trigger the Biodiversity Offset Scheme (BOS) and the preparation of a Biodiversity Development Assessment Report (BDAR) is required to accompany the DA as per Table 4 below.

Table 4 Biodiversity Offset Scheme assessment

BOS Trigger	Yes/No	Justification
Clearing threshold	No	The total clearing of native vegetation (0.11 ha) does not exceed the minimum clearing threshold of 0.5 ha, based on a minimum lot size of 2 ha.
BV Map	Yes	The project will impact on areas mapped within the BV Map.
Significant impact	No	The project is unlikely to result in a significant impact on threatened species, populations or communities listed under the BC Act.

It is recommended that an application for the refinement of Biodiversity Values mapping within the study area is undertaken, as the current mapping covers the majority of the site including exotic pasture. If the Biodiversity Values mapping is amended and the development can demonstrate avoidance of impacts to the Cumberland Plain Woodland CEEC, a BDAR will not be required, and a Flora and Fauna Impact Assessment should be prepared to support the DA.

Biosis would be happy to discuss our recommendations and the implications of the BOS for the project at your convenience.

I trust that this advice is of assistance to you however please contact me if you would like to discuss any elements of this ecological advice further.

Yours sincerely

R. Dwyer

Rebecca Dwyer
Principal Ecologist / BAM Accredited Assessor

References

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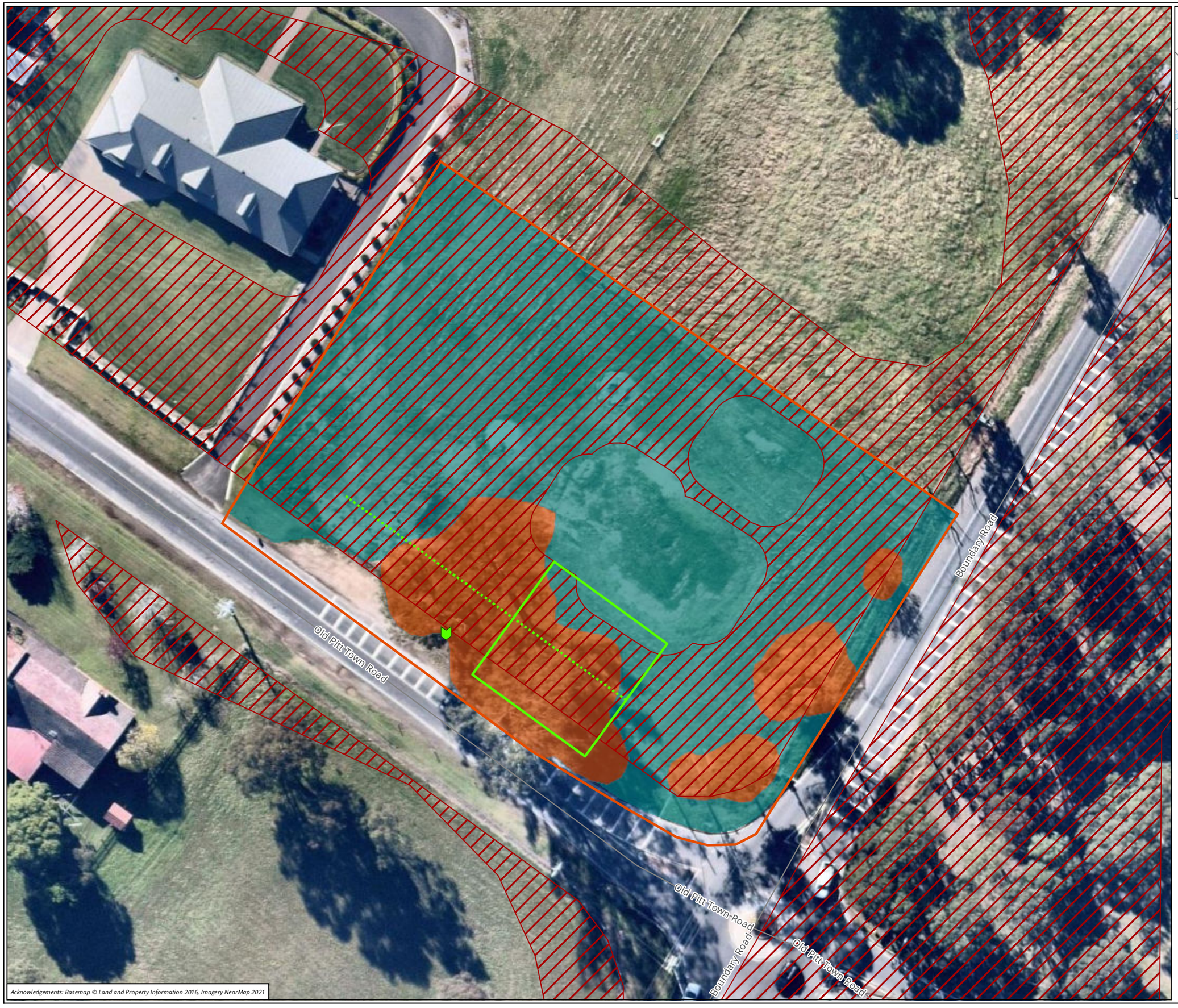
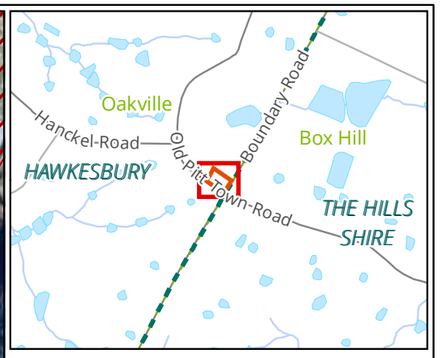
Phillips S and Callaghan J 2011. The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus.* Australian Zoologist 35 (3).

Appendices

Appendix 1 Figures





Legend

- Study area
- BAM quadrat
- BAM transect

High constraints

- Biodiversity Values Map
- PCT849 - Cumberland Plain Woodland CEEC (BC Act)

Low constraints

- Hollow-bearing trees
- Exotic pasture

Figure 1 Ecological constraints within the study area

0 5 10 15 20

Metres

N

Scale: 1:500 @ A3

Coordinate System: GDA 1994 MGA Zone 56

biosis

Matter: 35593,
Date: 12 July 2021,
Checked by: STC, Drawn by: JMS, Last edited by: jshepherd
Location: P:\35500s\35593\Mapping\35593_F1_EcoConstraints.mxd

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Appendix 2 Photos

Photo 1: Exotic Grassland within the study area

Photo 2: PCT 849 within the study area

Appendix 3 Flora

Flora species recorded from the study area

Table A. 1 Flora species recorded by Biosis, 22/06/2020

Status	Scientific name	Common name
Native species		
	Chloris ventricosa	Tall Chloris
	Cotula australis	Common Cotula
	Cynodon dactylon	Common Couch
	Cyperus gracilis	Slender Flat-sedge
	Dichondra repens	Kidney Weed
	Dysphania pumilio	
	Einadia nutans subsp. *linifolia*	Climbing Saltbush
	Einadia nutans subsp. *nutans*	Climbing Saltbush
	Einadia trigonos subsp. *trigonos*	Fishweed
	Eriochloa pseudoacrotricha	Early Spring Grass
	Eucalyptus crebra	Narrow-leaved Ironbark
	Eucalyptus moluccana	Grey Box
	Euphorbia drummondii	Caustic Creeper
	Glycine tabacina	Variable Glycine
	Microlaena stipoides	Weeping Grass
	Oxalis perennans	-
	Plantago varia	-
	Rumex brownii	Swamp Dock
Exotic species		
	Alternanthera pungens	Khaki Weed
	Amaranthus retroflexus	Redroot Amaranth
	Bidens pilosa	Cobbler's Pegs
	Bromus cartharticus	Prairie Grass
	Capsella bursa-pastoris	Shepherd's Purse
	Cenchrus clandestinus	Kikuyu
	Cerastium vulgare	Mouse-ear Chickweed
	Cirsium vulgare	Spear Thistle

	Conyza bonariensis	Fleabane
	Conyza canadensis	Fleabane
	Cyclospermum leptophyllum	Slender Celery
	Dimorphotheca ecklonis	Cape Daisy
	Ehrharta erecta	Panic Veldtgrass
	Eleusine indica	Crowsfoot Grass
	Eragrostis cilianensis	Stinkgrass
	Eragrostis curvula	African Lovegrass
	Gamochaeta purpurea	Purple Cudweed
	Gomphrena celosioides	Gomphrena Weed
	Hypochaeris radicata	Catsear
	Lagerstroemia indica	Crepe Myrtle
	Lolium multiflorum	Italian Ryegrass
	Lotus angustissimus	Slender Birds-foot Trefoil
	Malva neglecta	Dwarf Mallow
	Medicago polymorpha	Burr Medic
	Modiola caroliniana	Red-flowered Mallow
	Paronychia brasiliana	Chilean Whitlow Wort
	Plantago lanceolata	Lamb's Tongues
	Polycarpon tetraphyllum	Four-leaved Allseed
	Polygonum aviculare	Wireweed
	Setaria parviflora	Pigeon Grass
	Sida rhombifolia	Paddy's Lucerne
	Solanum nigrum	Black-berry Nightshade
	Solanum sisymbriifolium	-
	Soliva sessilis	Bindyi
	Sonchus asper	Prickly Sowthistle
	Stachys arvensis	Stagger Weed
	Taraxacum officinale	Dandelion
	Trifolium repens	White Clover
	Urtica dioica	Giant Nettle
	Verbascum virgatum	Twiggy Mullein
	Verbena bonariensis	Purpletop
	Vulpia bromoides	Squirrel Tail Fesque

BAM plot data

Table A. 2 BAM Plot data recorded by Biosis, 22/06/2020

Notes to tables:

N: Native E: Exotic HTE: High threat exotic	Stratum: • G: Ground cover • M: Mid storey • C: Canopy	Cover scores are % Abundance scores are numbers of individual plants

Family	Scientific name	Common name	Plot 1			
			N. E or HTE	Cover	Abundance	Stratum
Native species						
Asteraceae	*Cotula australis*	Common Cotula	N	0.4	100	G
Chenopodiaceae	*Dysphania pumilio*	Small Crumbweed	N	0.1	2	G
Chenopodiaceae	*Einadia nutans* subsp. *linifolia*	Climbing Saltbush	N	0.2	20	G
Chenopodiaceae	*Einadia nutans* subsp. *nutans*	Climbing Saltbush	N	0.1	4	G
Chenopodiaceae	*Einadia trigonos* subsp. *trigonos*	Fishweed	N	0.1	3	G

Family	Scientific name	Common name	Plot 1			
			N. E or HTE	Cover	Abundance	Stratum
Euphorbiaceae	*Euphorbia drummondii*	Caustic Creeper	N	0.1	20	G
Myrtaceae	*Eucalyptus moluccana*	Grey Box	N	10	1	C
Oxalidaceae	*Oxalis perennans*	-	N	0.1	10	G
Plantaginaceae	*Plantago varia*	-	N	0.4	100	G
Poaceae	*Chloris ventricosa*	Tall Chloris	N	0.1	10	G
Poaceae	*Cynodon dactylon*	Common Couch	N	5	50	G
Poaceae	*Microlaeana stipoides*	Weeping Grass	N	0.1	10	G
Exotic species						
Amaranthaceae	*Alternanthera pungens*	Khaki Weed	HTE	0.2	3	G
Asteraceae	*Cirsium vulgare*	Spear Thistle	E	0.1	1	G
Asteraceae	*Conyza bonariensis*	Fleabane	E	0.1	6	G
Asteraceae	*Dimorphotheca ecklonis*	Cape Daisy	E	0.1	2	G
Asteraceae	*Gamochaeta purpurea*	Purple Cudweed	E	0.1	4	G
Asteraceae	*Hypochaeris radicata*	Catsear	E	0.1	1	G
Asteraceae	*Soliva sessilis*	Bindyi	E	15	1000	G
Asteraceae	*Sonchus asper*	Prickly Sowthistle	E	0.2	5	G
Brassicaceae	*Capsella bursa-pastoris*	Shepherds Purse	E	0.3	40	G

Family	Scientific name	Common name	Plot 1			
			N. E or HTE	Cover	Abundance	Stratum
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort	E	0.3	60	G
Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved Allseed	E	0.1	30	G
Fabaceae - Faboideae	*Medicago polymorpha*	Burr Medic	E	0.3	6	G
Malvaceae	*Malva neglecta*	Dwarf Mallow	E	0.1	4	G
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	E	0.2	40	G
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	E	0.1	7	G
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	E	0.7	100	G
Poaceae	*Bromus catharticus*	Prairie Grass	E	0.2	10	G
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	HTE	0.1	2	G
Poaceae	*Eleusine indica*	Crowsfoot Grass	E	0.1	5	G
Poaceae	*Eragrostis curvula*	African Lovegrass	HTE	35	500	G
Poaceae	*Lolium multiflorum*	Italian Ryegrass	E	0.2	8	G
Poaceae	*Vulpia bromoides*	Squirrel Tail Fesque	E	0.1	10	G
Polygonaceae	*Polygonum aviculare*	Wireweed	E	0.1	1	G
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	E	0.3	6	G
Solanaceae	*Solanum sisymbriifolium*	-	E	0.2	4	G

Appendix 4 Fauna

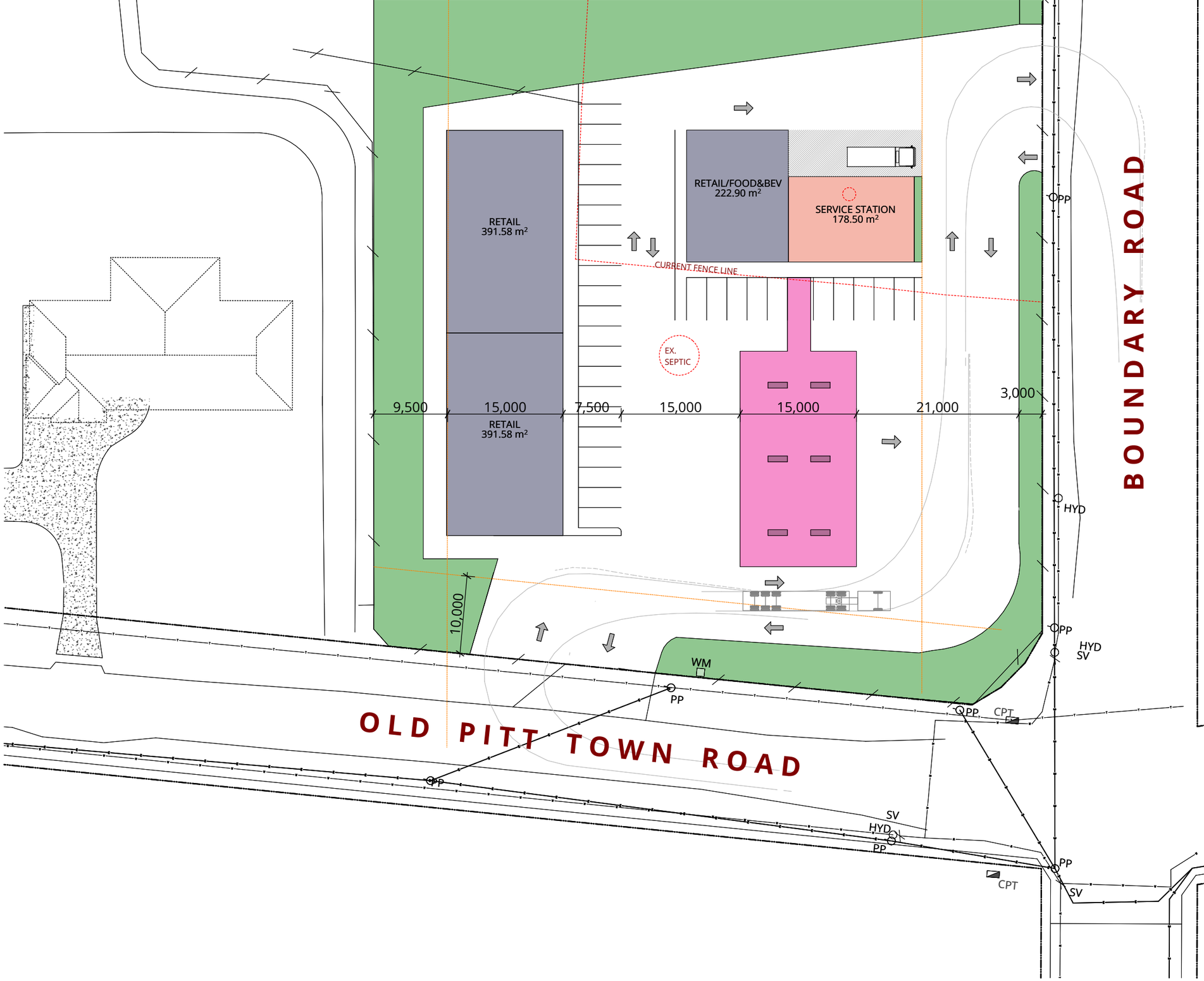
Fauna species recorded from the study area

Table A. 3 Fauna species recorded by Biosis, 22/06/2020

Status	Scientific name	Common name
Birds		
O	*Trichoglossus moluccanus*	Rainbow Lorikeet
O	*Cracticus tibicen*	Australian Magpie
O	*Grallina cyanoleuca*	Magpie-lark
O	*Corvus coronoides*	Australian Raven
O	*Sturnus vulgaris*	Common Starling
O	*Manorina melanocephala*	Noisy Miner
O	*Vanellus miles*	Masked Lapwing
Mammals		
O	*Ovis sp*	Sheep

O = observed, W = heard call, F = scratchings.

Appendix 5 Design layout options for the project



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LEGEND

BW1 BLOCKWORK - TYPE 1

CON1 CONCRETE - TYPE 1

NOT FOR CONSTRUCTION

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ISSUE	DESCRIPTION	BY	CHK	DATE
01 - WIP	Preliminary Issue for Consultant			Work in Progress

Work in Progress

PROJECT OAKVILLE FEASO

CLIENT FRANK AND LISA GATT

DRAWING OPTION 1

PROJECT NO. 2019-063

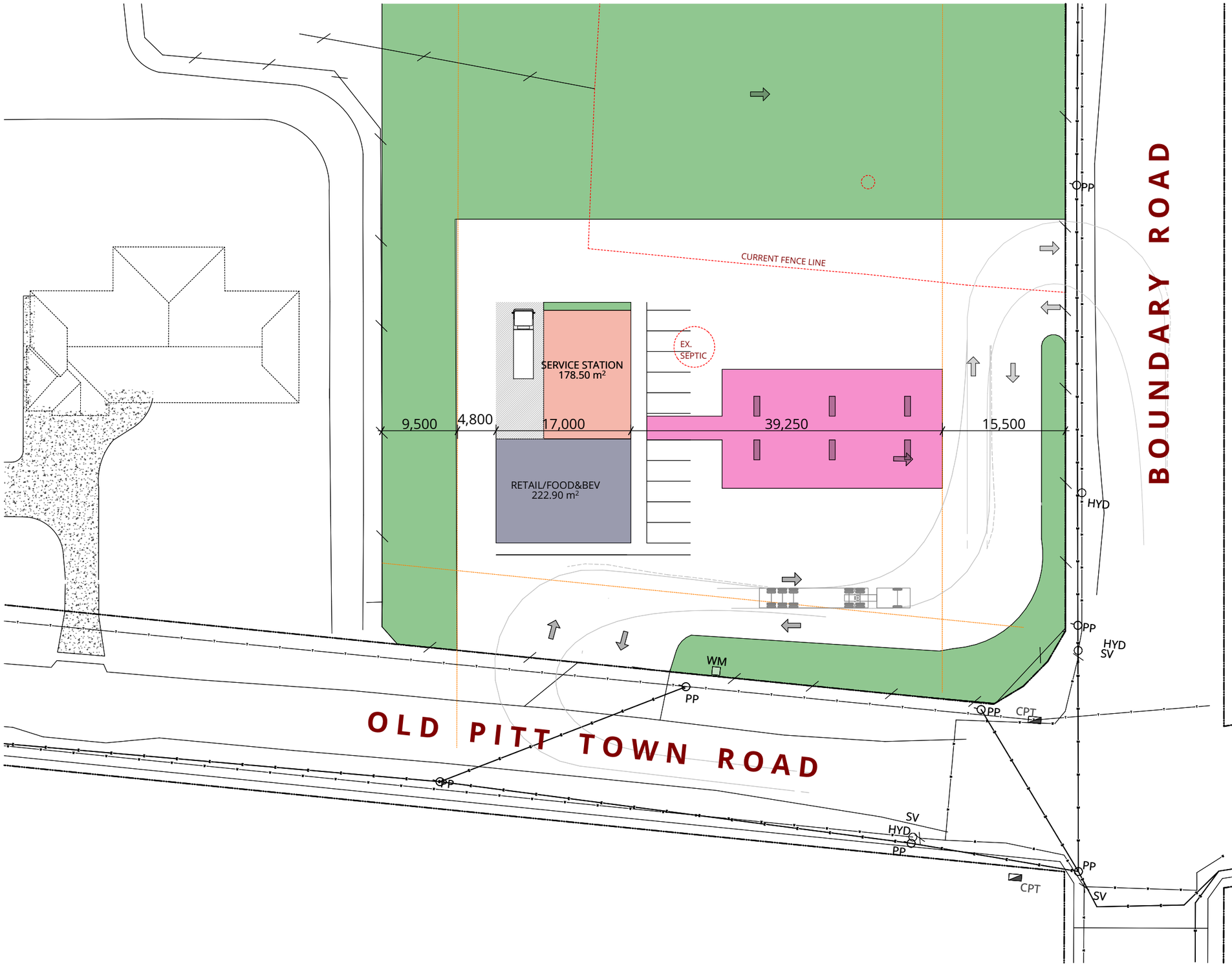
LOCATION 745 OLD PITT TOWN ROAD OAKVILLE NSW

DRAWING NO. SK02

ISSUE NO. 01 - WIP

SCALE 1:500@A3

SPACE·DESIGN·ARCHITECTURE



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LEGEND

BW1 BLOCKWORK - TYPE 1

CON1 CONCRETE - TYPE 1

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PROJECT OAKVILLE FEASO

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DRAWING OPTION 2

PROJECT NO. 2019-063

LOCATION 745 OLD PITT TOWN ROAD OAKVILLE NSW

DRAWING NO. SK03

ISSUE NO. 01 - WIP

SCALE 1:500@A3

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