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Re: Ecological Constraints Assessment at Lot 2 // DP1168922; Lot 11 // DP1045242, Campbell St, Gerringong, NSW

Dear James,

This letter outlines the methods and results of an Ecological Constraints Assessment (ECA) prepared for the Lot 2 // DP1168922; Lot 11 // DP1045242, Campbell St, Gerringong, NSW, the '**study area.'** The study area is located in the Kiama Local Government Area (KLGA), (New South Wales).

Background and purpose of the report

As indicated in the brief provided by you on 13 September 2019 (K128069/K128070), *Allen Price & Scarratts Pty Ltd* have been engaged to assist with the preparation of a Planning Proposal (PP) to guide a site-specific Master Plan (MP) for the study area. In summary, the proposal is to facilitate expansion of the Gerringong township by providing a new residential area. Ecoplanning have been commissioned to prepare an ECA to inform the rezoning of the site and to later inform the site-specific MP. An indicative development footprint has been provided, herein the **'subject site**'. The subject site is part of the study area.

As shown in **Figure 1**, the development footprint affects only portions of the lots (Lot 2 // DP1168922 and Lot 11 // 1045242) (**Figure 1**).

The ECA aims to identify the ecological values present within the study area, identify potential constraints to the proposed re-zoning, and briefly outline the approval pathways relating to potential impacts to biodiversity. Specifically, this ECA has been prepared to consider threatened species, populations and ecological communities listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Biodiversity Conservation Act 2016* (BC Act).

Methods

Literature review and database analysis

A site-specific literature and a database review were undertaken prior to the field survey and the preparation of this report. This included desktop analysis of aerial photography and review of regional scale information from the follow data sources:

- NSW ePlanning Spatial Viewer (DPIE 2019)
- BioNet Atlas of NSW Wildlife (OEH 2019)
- Southeast NSW Native Vegetation Classification and Mapping (SCIVI 2010)
- Protected Matters Search Tool (DoEE 2019)
- SIX Maps (LPI 2019)
- Biodiversity Values Map and threshold tool (OEH 2019a)
- Water Management (General) Regulation 2018 hydro line spatial data (NSW DPIE 2018)

Threatened species, populations and migratory species recorded within 5 km of the approximate centre of the subject site were consolidated in a search of the Atlas of NSW Wildlife (BioNet) (OEH 2019) and the Protected Matters Search Tool (DoEE 2019). Their likelihood of occurrence was assessed by:

- Review of location and date of recent (<5 years) and historical (>5-20 years) records,
- Review of available habitat within the study area and surrounding areas,
- Review of the scientific literature pertaining to each species and population,
- Applying expert knowledge of each species.

Following a review of available habitat within the study area, the potential for each threatened species, population and/or migratory species to occur was considered. The potential for species to use the study area and to be affected directly or indirectly by the proposed action were considered as either:

- "Recent record" = species has been recorded in the study area within the past 5 years
- "High" = species has previously been recorded in the study area (>5 years) or in proximity (for mobile species), and/or habitat is present that is likely to be used by a local population
- "Moderate" = suitable habitat for a species is present onsite but no evidence of a species detected and relatively high number of recent records (5-20 years) in the locality or species is highly mobile
- "Low" = suitable habitat for a species is present onsite but limited or highly degraded, no evidence of a species detected and relatively low number of recent records in the locality

- "Not present" – suitable habitat for the species is not present onsite or adequate survey has determined species does not occur in the study area.

A site inspection of the study area was undertaken by John Gollan (Ecologist) on 5 November 2019, over approximately 3 hours. The purpose of this site inspection was to validate vegetation community mapping, assess the structure and condition of vegetation in the study area, and to compile a list of dominant flora species. Additionally, habitat features (i.e. geology, vegetation structure, tree hollows, stags, decorticating bark, mature / old growth trees, winter-flowering eucalypts) and indirect signs of fauna use (i.e. scats, owl pellets, fur, bones, tracks, bark scratches, foliage chew marks and chewed capsules) were recorded to inform an assessment of the likelihood of threatened species occurring within the study area.

Site description

The study area is wholly located within Kiama LGA and comprises an area of approximately 72 hectares. The subject site is around one-third of the 72 hectares, totalling 26.4 hectares. Aerial image interpretation reveals that the majority of the site is arable farmland. An extension of Campbell Street, Gerringong continues through the centre of the site and services a number of dwellings, farm buildings and stock yards. This road runs along the top of a north-south running ridgeline. Tall vegetation is sparse across the site, being concentrated around the dwellings and in linear rows that follow a number of internal fence lines.

Four streams are mapped on the study area, although only a small portion of one of these streams is within the subject site itself. This 3rd order Strahler stream drains water from the town of Gerringong to the north, eventually draining into the Crooked River around two kilometres to the southwest. Streams and their Strahler order are shown in **Figure 2**.

More broadly, the site is flanked on the northern and eastern sides by the urban area known as 'Elambra Estate'. To the south and west are vast tracks of farmland. Native vegetation within the locality (5 km of the study area) is primarily associated with the Seven Mile Beach National Park to the southwest and escarpment foothills to the northwest. Vegetation mapping reveals approximately 1000 hectares of native vegetation in the locality, none of which is mapped in the study area (**Figure 3**).

Both lots in the study area are zoned *RU2 Rural Landscape* under the Kiama Local Environmental Plan (KLEP) (2011). Objectives of the RU2 zone and permissions (with and without consent) are provided in **Appendix A**.

Results

Vegetation communities – desktop assessment

Vegetation mapping (SCIVI 2010) shows no intact native vegetation within the study area. The site assessment verified the desktop mapping, although there are two mature *Ficus* spp. (collectively and commonly called 'Fig trees') that may be remnants of a native plant community (detail below).

Vegetation communities – field survey

The paddocks, used for grazing cattle and growing fodder for livestock, were dominated by the exotic pasture grasses such as Kikuyu (*Cenchrus clandestinus**) and Perennial Ryegrass (*Lolium perenne**). Weedy, low growing herbs such as Fireweed (*Senecio madagascariensis**), Spear Thistle (*Cirsium vulgare**), Lamb's Tongues (*Plantago lanceolata**), Catsear (*Hypochaeris radicata**), White Clover (*Trifolium repens**) and Curled Dock (*Rumex crispus**) were also present. There were occasional paddock trees that were identified as exotic Coral Tree (*Erythrina x sykesii*;* **Photo 1**).

Canopy forming and woody shrubs were concentrated around the dwellings, sheds, stockyards and along fence lines. The vegetation along paddock fence lines were dominated by the exotic Cape Honeysuckle (*Tecoma capensis*;* **Photo 2**), while vegetation around the buildings were mostly a mix of exotics (such as *Murraya paniculata**, *Cinnamomum camphora** and *Cupressus leylandii**) and native species. The native species, which included tall canopy forming species and lower growing small trees and shrubs, were obviously planted as they were arranged in regularly spaced, straight rows (**Photo 3**). Many of these natives are also ornamental varieties, often planted as garden specimens or for shade, and are not indigenous to the region e.g. *Corymbia ficifolia* (Red-flowering gum) and *Lophostemon confertus* (Brushbox). Observation of three individuals native to the region were made (*Eucalyptus tereticornis*, *E. pilularis* and *Ceratopetalum gummiferum*). Their position within garden beds and in straight rows indicates they were most likely planted.

Trees that were outside of the managed garden beds, and indigenous to the region, were two mature figs (*Ficus macrophylla* and *Ficus obliqua*), each reaching a height of approximately 15-20 m with a similar width (**Photo 4**). It is unclear whether they are remnants of the complex littoral rainforest vegetation community (COM-LRF) that is likely to have existed prior to clearing for agriculture (Mills and Associates 2006) or if they have been planted, but their height and girth suggests they have been growing for many decades.

Aquatic/semi-aquatic vegetation is also present within the study area and found in and along the 3rd order stream. The dominant species in the watercourse is the emergent macrophyte *Typha orientalis* (**Photo 5**). Other dominant species were natives *Alisma plantago-aquatica* (Water Plantain), *Azolla* spp., *Ranunculus inundatus* (River Buttercup), *Ludwigia peploides* (Water Primrose) and *Juncus usitatus.* Some exotics were also present in and around the water's edge such as *Salix babylonica** (Weeping Willow), *Cyperus brevifolius** (Mullumbimby Couch) and *Zantedeschia aethiopica** (Arum Lilly).

A species inventory is included in **Appendix B** and vegetation mapping that reflects the broad conditions within the subject site is shown in **Figure 5**.

Fauna habitat

Fauna habitat in the study area predominately consists of cleared land for agriculture. Planted native and exotic vegetation in garden beds also provides habitat. Almost all of the study area has been cleared and is dominated by exotic pasture, which provides minimal foraging habitat for birds and microbats. The *Ficus* spp. within the subject site contained hollows, which provide valuable nesting, roosting and breeding habitat for native fauna. The third-order stream along the eastern boundary of the study area, which contains permanent water, is also likely habitat for aquatic fauna such as eels and tortoises. Microbats may also utilise the waterbody and submerged and emergent plants are habitat for amphibians.

Threatened species

A number of common bird species were identified opportunistically during field inspection. Numerous individuals of the migratory species, *Ardea ibis* (Cattle Egret), which is listed as 'Marine' under the EPBC Act, were also sighted within the study site. A list of fauna sighted during field inspection is included in **Appendix C**.

The threatened species that have been identified within the locality (within a 5 kilometre radius) were collated from records of the Atlas of NSW Wildlife (OEH 2019). The records were plotted (**Figure 4**) and a likelihood analysis of their presence on the site was conducted prior to, and following field inspection. The results are summarised below and the full analysis is presented in **Appendix D**.

Searches identified 26 threatened species (three flora and 23 fauna) listed under the BC Act or EPBC Act have been previously identified within the locality, two of which had been recorded within the subject site itself: *Pteropus poliocephalus* (Grey-headed Flying Fox) and *Calyptorhynchus lathami* (Glossy Black-Cockatoo).

Following site inspection, that identified two important habitat features (hollow bearing trees and a permanent waterbody nearby), several threatened fauna species were considered to have a 'moderate' or 'high' likelihood of occurrence. These species were:

- *Ardea ibis* (Cattle Egret)
- *Myotis macropus* (Southern Myotis)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)

It is also noted that even though Green and Golden Bell Frog (*Litoria aurea*), which is listed as Endangered under the BC Act and Vulnerable under the EPBC Act, has not been previously identified within the locality, the third-order stream to the east is considered potential habitat and any future development should avoid impacts to this species.

Biodiversity Values and Protected Land

A review of the Biodiversity Values Map (OEH 2019a) showed that none of the study area is included. Likewise, there are no areas identified as protected for Terrestrial Biodiversity under the KLEP (2011). No further consideration was taken in relation to this aspect.

All streams shown in **Figure 2**, and with the exception of the 1st order stream, are identified 'Riparian Lands and Watercourses for Protection' (KLEP 2011). As such they are subject to regulation by the *Water Management Act 2000* (WM Act).

The Natural Resources Access Regulator (NRAR) guidelines require a Vegetated Riparian Zone (VRZ) either side of mapped drainage lines (NRAR 2018). The area of the VRZ is related to the stream order and is measured from the top of bank (ToB). Second-order watercourses require a 20 m VRZ either side, with 30 m for 3rd order and 40 m for 4th order and above.

Ecological values within the study area

Ecological constraints can be ranked using criteria such as 'high', 'moderate', 'low' and 'none' according to their ecological value(s). Values for a 'high' constraint might be, for example, the presence of native vegetation that are listed as threatened ecological community (TEC) under the BC Act or the EPBC Act. A 'low' ranking might be for the presence of a first order stream.

Ecological constraints for the subject area are presented in **Table 1** and **Figure 6**.

Justification and recommendations are given below.

Table 1: Ecological constraints within the study area.

Ecological Constraint	Criteria
High	• Mature *Ficus* spp. (native vegetation) with hollows.
Moderate	• Tall, canopy forming native vegetation that is not listed as TEC under the BC Act or EPBC Act. • Watercourses identified on the 'Riparian Lands and Watercourses' Map (KLEP 2011).
None	• Cleared land • Weeds and exotics

(High constraint) Mature Ficus spp. *(native vegetation) with hollows*

The two mature *Ficus* spp. ('Fig trees') within the subject site may be remnants of an ecological community that existed prior to clearing for agriculture. The ecological community is now endangered. These trees also contained a number of hollows and likely to provide habitat for native fauna, especially microbats, many of which are threatened. While clearing of these two trees may be permissible with consent, it is recommended that the final design of any future subdivision seek to retain these trees. Rezoning these areas to *'RE1 Public Recreation'* or '*E2 Environmental Conservation'* would be a beneficial. It is also noted that indigenous Fig trees make special mention in the Kiama Development Control Plan (2012) in that "the need to conserve the remaining mature historic trees for future generations is most important."

(Moderate constraint) Tall, canopy forming native vegetation that is not listed as TEC under the BC Act or EPBC Act.

There are tall, canopy forming native trees within garden beds and amongst exotic plants around the existing dwellings (e.g. **Photo 3**). Given there linear arrangement it is most likely that these trees have been planted and thus are not remnant trees that existed prior to past land clearing in the area. While there were no hollows identified in these trees, they are likely to provide refuge and forage habitat for some native species at various times of the year.

(Moderate constraint) Watercourses identified on the 'Riparian Land and Watercourses' Map (KLEP 2011).

The Natural Resources Access Regulator (NRAR) requires approval for development on waterfront land (i.e. within 40m of top of bank). A Vegetated Riparian Zone (VRZ) either side of mapped drainage lines are also required (NRAR 2018). The area of the VRZ is related to the stream order and is measured from the top of bank (ToB). Since ToB mapping was not available, the VRZs shown on the constraints map (**Figure 6**) are from the mapped stream bed.

Some works and activities can occur on waterfront land and in riparian corridors (see Table 2 in NRAR 2018). For first-order streams, these include stream realignment, while alignment is not possible in third-order streams. It should also be noted that where a watercourse does not exhibit the features of a defined channel with bed and banks, NRAR may determine that the watercourse is not waterfront land for the purposes of the WM Act.

From examination of **Figure 6** it appears that most of the subject site does not intersect with waterfront land and thus avoids direct impact to watercourses. Top of bank mapping is required to confirm this. There are two certain areas that do have direct impacts to the 3rd order stream, both along the eastern perimeter of the subject site. These are the intended road crossings/entrance ways. As above, necessary approvals for controlled activities on waterfront land will be needed from NRAR.

Direct impacts aside, there are also likely to be indirect impacts to these watercourses from residential development, both pre and post construction. It is possible that the third-order stream is used by microbats and other native fauna. In line with *Environmental Planning and Assessment Act 1979* (EPA Act), impact assessment to flora and fauna would need to accompany a DA for residential development.

Conclusions and recommendations

The presence of two mature Fig trees within the study area pose a 'High' constraint. These trees may be remnants of an endangered ecological community. Hollows are present, which are important habitat for native fauna, particularly microbats, many of which are threatened. It is recommended that these trees be given protection (via re-zoning appropriately e.g. RE1 or E2) to retain the ecological value they hold.

Protected riparian land is also present within and around the site, and these have been deemed as a 'Moderate' constraint. As required by NRAR (2018), a Vegetated Riparian Zone (VRZ) is required depending on their Strahler order. Applications for a *Controlled Activity Approval* and

more information about controlled activities on waterfront land can be conducted through NRAR (www.industry.nsw.gov.au/nrar).

The third-order stream that contains permanent water with dense vegetation, and thus potentially important for threatened microbats and possibly the endangered Green and Gold Bell Frog, has also been assigned as a 'Moderate' constraint. In line with the EP&A Act, impact assessment to flora and fauna would need to accompany a DA for future residential development.

Finally, there is canopy forming native vegetation that has been planted among exotic species around the dwellings at the site. While this vegetation is not remnant, nor is it part of a listed TEC under the BC Act or EPBC Act, the trees do have value as fauna habitat and will need to be considered as part of a flora and fauna assessment.

Please contact me if you have any questions about this assessment.

Yours sincerely

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Water Management Act (WM Act) (2000).. Available at: https://legislation.nsw.gov.au/#/view/act/2000/92

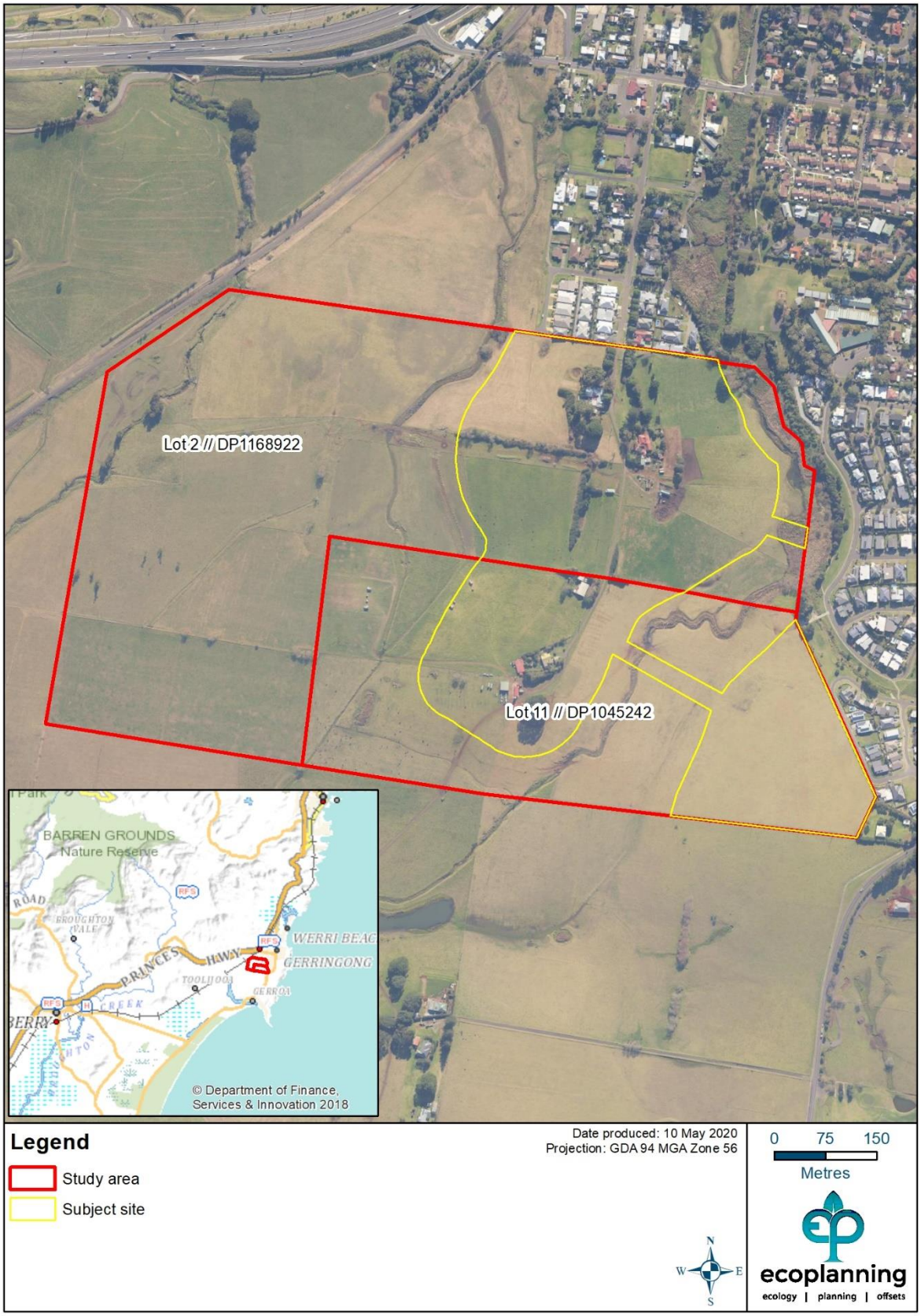

Figure 1: Study area and subject site.

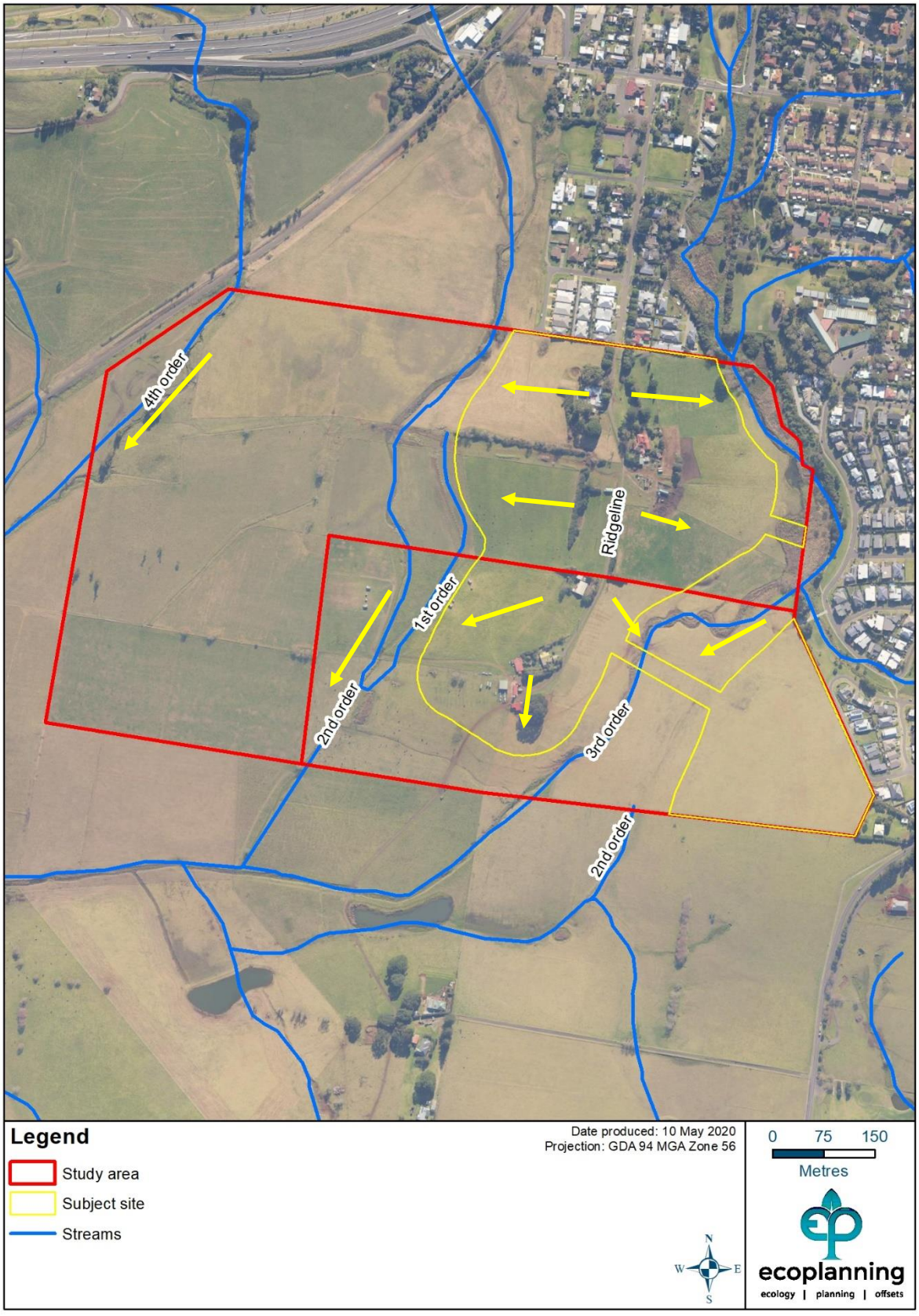

Figure 2: **Mapped streams and their Strahler order. Arrows indicate general direction of watershed.**

Figure 3: Native vegetation mapping in the locality (SCIVI 2010).

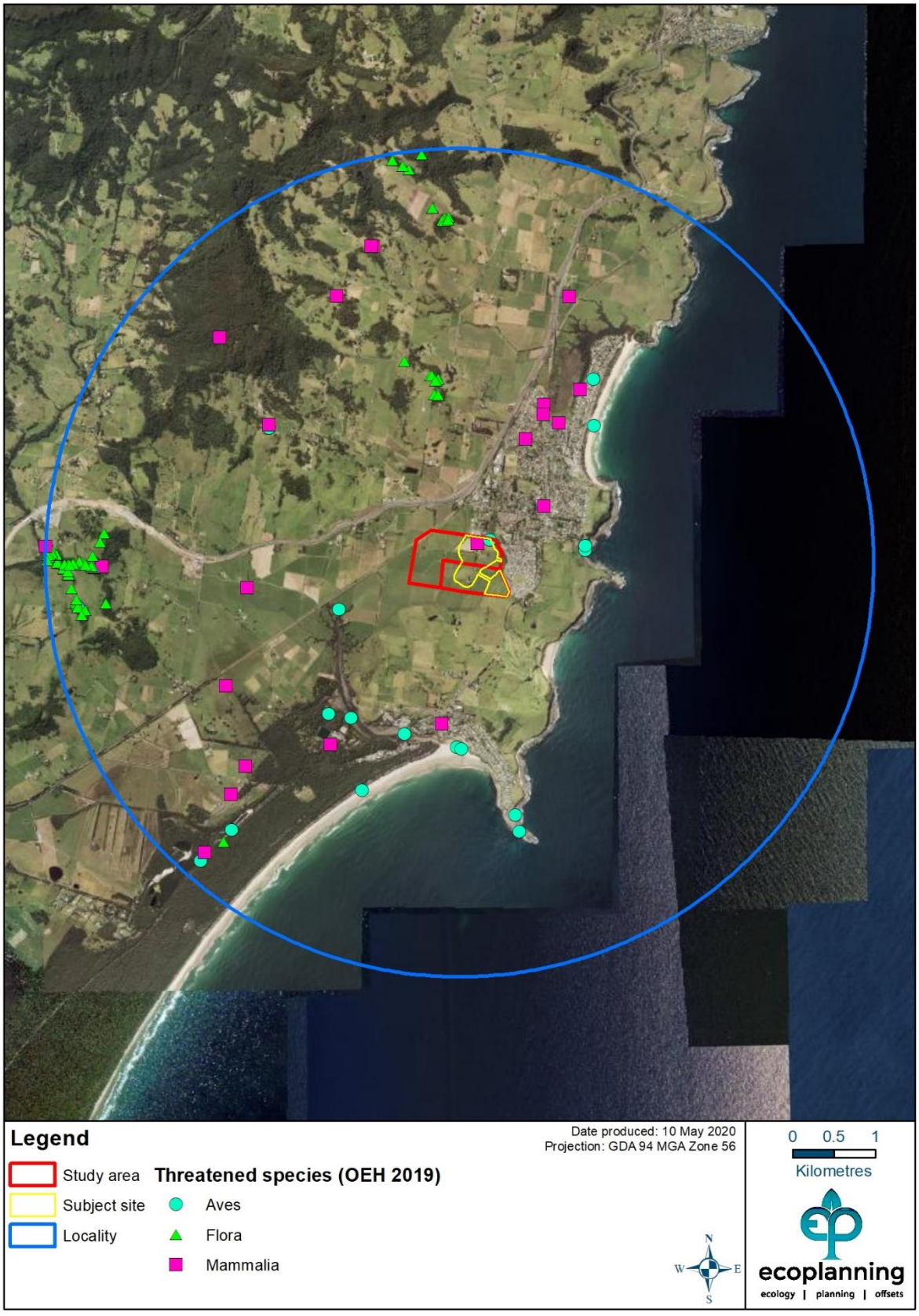

Figure 4: **Threatened species recorded within the locality (5km from the approximate centre of the Study area).**

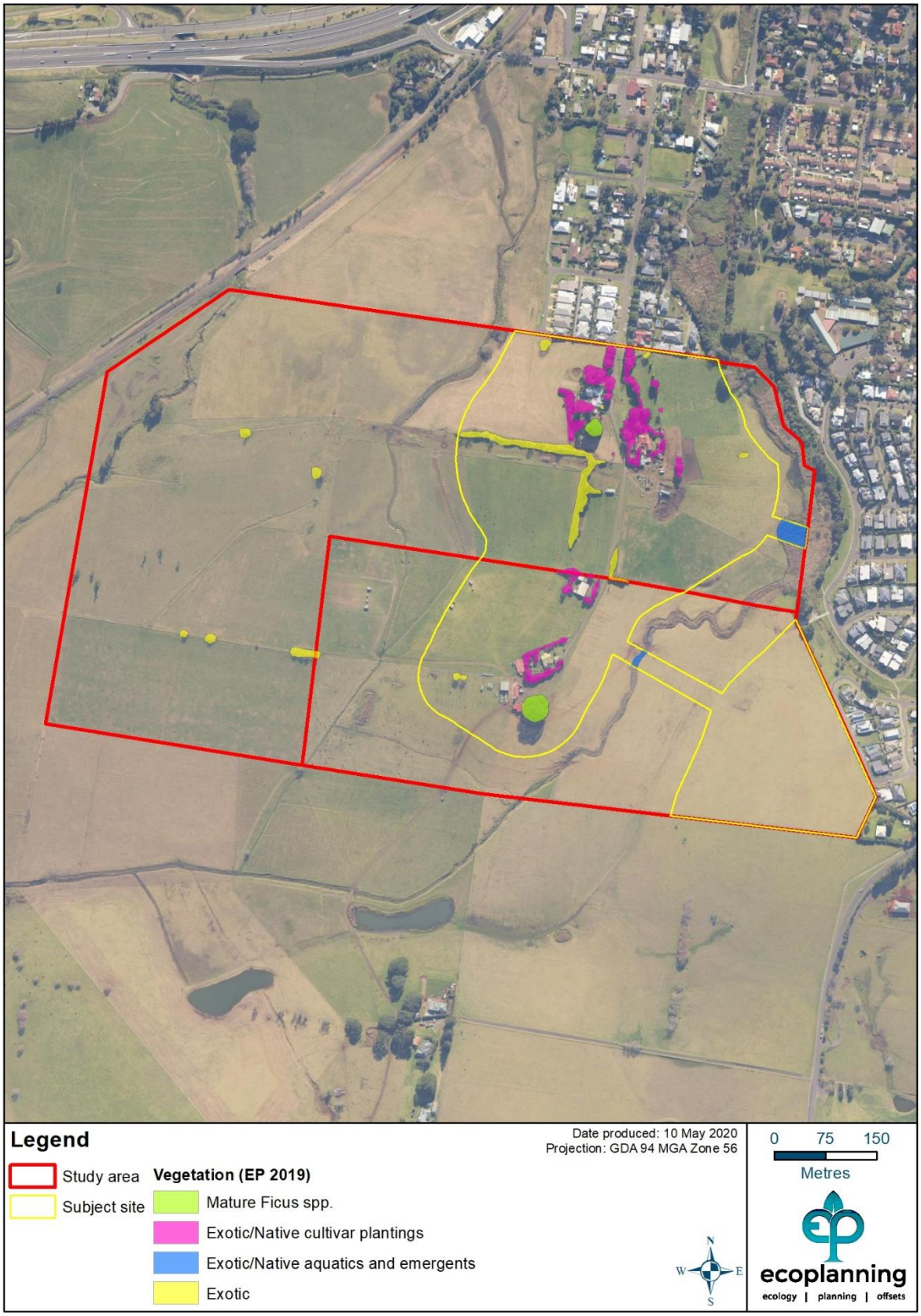

Figure 5: Vegetation mapping within the subject site (EP 2019).

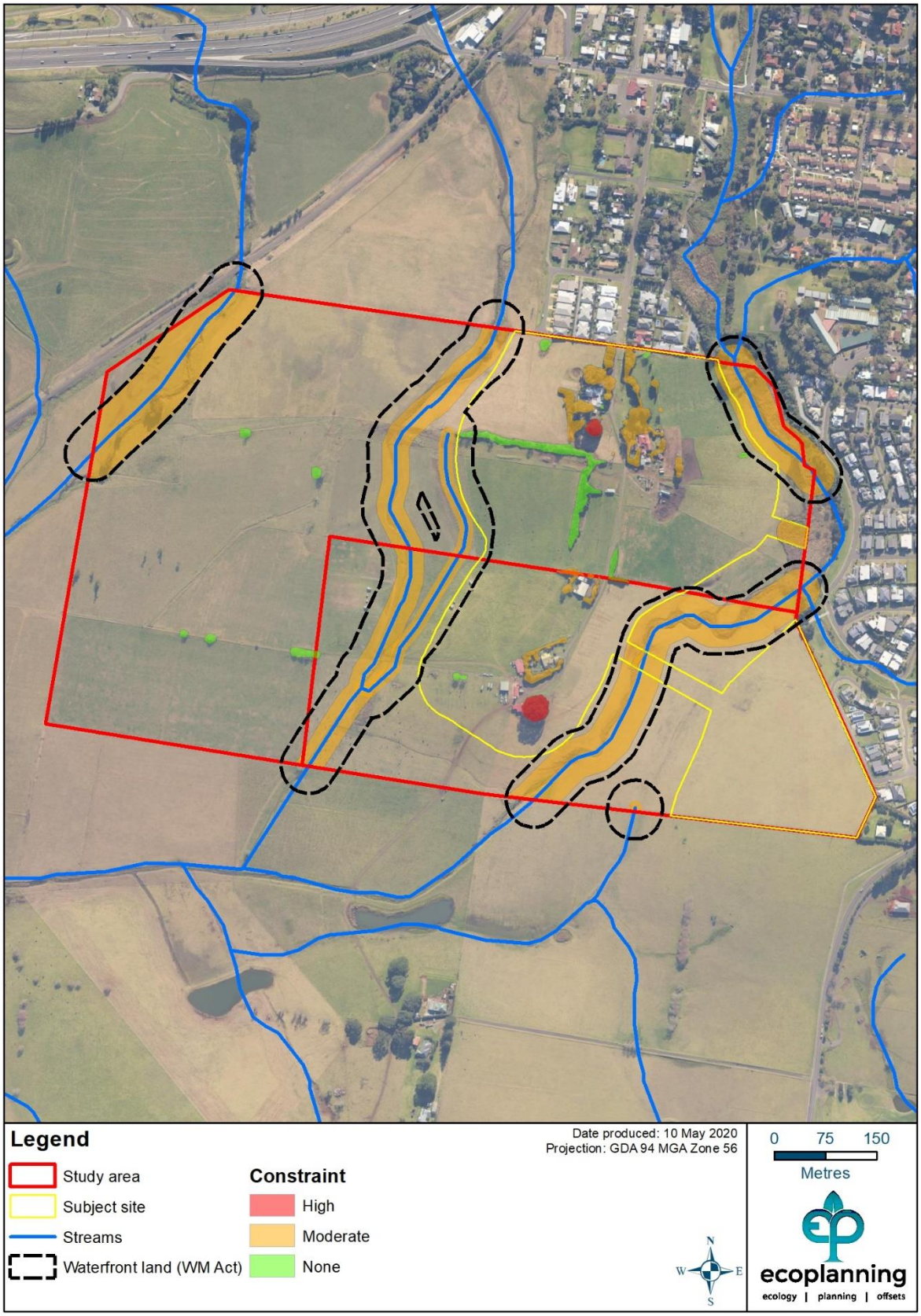

Figure 6: **Ecological constraints within the study area. Note that cleared land (Constraint = 'None') has not been represented in the legend.**

Photo 1: Exotic Coral Trees (*Erythrina* x *sykesii) in a paddock within the subject area.**

Photo 2: Hedge of exotic Honeysuckle (*Tecoma capensis) in a paddock within the subject area.**

Photo 3: Eucalypts within a garden bed and planted in straight row as a driveway feature.

Photo 4: **Mature *Ficus* within the subject site.**

Photo 5: **Broadleaf Cumbungi (*Typha orientalis*) is a dominant native of the stream to the east of the subject site.**

APPENDIX A – Objectives and permission of Zone RU2 Rural Landscape (KLEP 2011)

Zone RU2 Rural Landscape

1 Objectives of zone

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To maintain the rural landscape character of the land.
- To provide for a range of compatible land uses, including extensive agriculture.
- To protect agricultural land for long term agricultural production.
- To provide opportunities for employment-generating development that adds value to local agricultural production through food and beverage processing and integrates with tourism.

2 Permitted without consent

Environmental protection works; Extensive agriculture; Home occupations

3 Permitted with consent

Agricultural produce industries; Air transport facilities; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cellar door premises; Cemeteries; Community facilities; Crematoria; Dairies (restricted); Dwelling houses; Eco-tourist facilities; Environmental facilities; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Highway service centres; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Industrial retail outlets; Information and education facilities; Intensive plant agriculture; Recreation areas; Roads; Roadside stalls; Secondary dwellings; Water supply systems

4 Prohibited

Any development not specified in item 2 or 3

APPENDIX B – Flora inventory

Family	Species	Common name
Alismataceae	*Alisma plantago-aquatica*	Water Plantain
Alliaceae	*Agapanthus* sp.*	
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Apocynaceae	*Araujia sericifera**	White Moth Vine
Araceae	*Zantedeschia aethiopica**	Arum Lily
Araliaceae	*Hydrocotyle tripartita*	Pennywort
Araucariaceae	*Araucaria heterophylla**	Norfolk Island Pine
Arecaceae	*Syagarus romanzoffiana**	Queen Palm
Asteraceae	*Cirsium vulgare**	Spear Thistle
	*Hypochaeris radicata**	Cats ear
	*Senecio madagascariensis**	Fireweed
Azollaceae	*Azolla* spp.	
Bignoniaceae	*Tecoma capensis**	Cape Honeysuckle
Brassicaceae	*Rorippa nasturtium-aquaticum**	Watercress
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cunoniaceae	*Ceratopetalum gummiferum*†	Christmas Bush
Cupressaceae	*Cupressus leylandii**	Leyland's Cyperus
Cyperaceae	*Cyperus brevifolius**	Mullumbimby Couch
Euphorbiaceae	*Euphorbia peplus**	Petty Spurge
Fabaceae (Faboideae)	*Erythrina x sykesii**	Coral tree
	*Trifolium repens**	White Clover
Juncaceae	*Juncus usitatus*	
Lauraceae	*Cinnamomum camphora**	Camphor Laurel

Family	Species	Common name
Moraceae	*Ficus macrophylla*	Moreton Bay Fig
	Ficus obliqua	Small-leaved Fig
Myrtaceae	*Callistemon hybrids*†	Bottlebrush
	Corymbia ficifolia†	Flowering Gum
	Eucalyptus microcorys†	Tallowwood
	Eucalyptus pilularis†	Blackbutt
	Eucalyptus tereticornis†	Forest Red Gum
	Lophostemon confertus†	Queensland Brush box
Oleaceae	*Fraxinus* sp.*	
Onagraceae	*Ludwigia peploides*	Water Primrose
Pinaceae	*Picea* sp.*	
	Pinus spp.*	
Plantaginaceae	*Plantago lanceolata**	Lamb's Tongues
Platanaceae	*Platanus x hispanica**	London Plane Tree
Poaceae	*Bromus cartharticus**	Soft Brome
	*Cenchrus clandestinus**	Kikuyu Grass
	Cynodon dactylon	Couch
	*Eragrostis curvula**	African Lovegrass
	*Lolium perenne**	Perennial Ryegrass
	*Poa annua**	Winter Grass
Polygonaceae	*Rumex crispus**	Curled Dock
Proteaceae	*Grevillea robusta*†	Silky Oak
Ranunculaceae	*Ranunculus inundatus*	River Buttercup
Rosaceae	*Rubus fruticosus* L. species agg.*	Blackberry

Family	Species	Common name
Rutaceae	*Murraya paniculata**	Mock Orange
Salicaceae	*Salix babylonica**	Weeping Willow
Thecae	*Camellia* sp.*	
Typhaceae	*Typha orientalis*	Broadleaf Cumbungi
Verbenaceae	*Lantana camara**	Lantana

*denotes exotic species. †denotes species not indigenous to the region, and/or are planted natives.

APPENDIX C – Fauna inventory

Family	Species	Common name
Ardeidae	*Ardea ibis*	Cattle Egret
Artamidae	*Cracticus tibicen*	Australian Magpie
Cacatuidae	*Cacatua sanguinea*	Little Corella
	Cacatua galerita	Sulphur-crested Cockatoo
Corvidae	*Corvus coronoides*	Australian Raven
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra
Meliphagidae	*Manorina melanocephala*	Noisy Miner
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
Sturnidae	*Acridotheres tristis**	Common Myna
	*Sturnus vulgaris**	Common Starling

*denotes exotic species

APPENDIX D - Likelihood of occurrence for threatened species

Scientific Name Common Name	Legal Status	Number of records	Closest record and date	Most recent record and date	Likelihood of occurrence	
					Prior to field assessment	Post field assessment[!]
KINGDOM: Animalia; CLASS: Aves						
Ardea ibis Cattle Egret	EPBC Act: C,J	1	2.29 km (16/07/2007)	2.29 km (16/07/2007)	Moderate	High
Ardenna tenuirostris Short-tailed Shearwater	EPBC Act: J,K	1	2.81 km (10/12/2011)	2.81 km (10/12/2011)	Low- habitat not present	Low- habitat not present
Artamus cyanopterus cyanopterus Dusky Woodswallow	BC Act: V	2	4.64 km (20/02/2007)	4.64 km (20/02/2007)	Low	Low – cleared land unlikely habitat
Callocephalon fimbriatum Gang-gang Cockatoo	BC Act: V	1	4.24 km (15/09/2008)	4.24 km (15/09/2008)	Low	Low – forage habitat only
Calonectris leucomelas Streaked Shearwater	EPBC Act: C,J,K	1	2.74 km(13/02/2014)	2.74 km (13/02/2014)	Low- habitat not present	Low - habitat not present
Calyptorhynchus lathami Glossy Black-Cockatoo	BC Act: V	1	0.46 km (1/01/2000)	0.46 km (1/01/2000)	High	Low - preferred feed trees not present. Likely a 'flyover' record.
Haematopus fuliginosus Sooty Oystercatcher	BC Act: V	2	1.53 km (29/04/2007)	3.12 km (19/07/2014)	Low- habitat not present	Low – intertidal habitat not present

Scientific Name Common Name	Legal Status	Number of records	Closest record and date	Most recent record and date	Likelihood of occurrence	
					Prior to field assessment	Post field assessment[1]
Haematopus longirostris Pied Oystercatcher	BC Act: E1	5	2.17 km (1/12/2017)	2.17 km (1/12/2017)	Low- habitat not present	Low - intertidal habitat not present
Haliaeetus leucogaster White-bellied Sea-Eagle	BC Act: V EPBC Act: C	3	1.69 km (29/08/2013)	1.69 km (29/08/2013)	Low	Low – marginal foraging habitat only
Hieraaetus morphnoides Little Eagle	BC Act: V	1	1.56 Km (21/07/2007)	1.56 km (21/07/2007)	Low	Low – marginal foraging habitat only
Macronectes halli Northern Giant-Petrel	BC Act: V EPBC Act: V	1	2.32 km (10/06/2007)	2.32 km (10/06/2007)	Low- habitat not present	Low - habitat not present
Ninox connivens Barking Owl	BC Act: V	1	1.69 km (1/04/2016)	1.69 km (1/04/2016)	Low	Low
Ninox strenua Powerful Owl	BC Act: V	2	1.54 km (16/08/2005)	1.54 km (16/08/2005)	Low	Low
KINGDOM: Animalia; CLASS: Mammalia						
Dasyurus maculatus Spotted-tailed Quoll	BC Act: V EPBC Act: E	5	2.06 km (1/07/2010)	2.17 km (16/07/2010)	Low	Low
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	BC Act: V	2	3.55 km (14/02/2012)	3.55 km (14/02/2012)	Low	Low

Scientific Name Common Name	Legal Status	Number of records	Closest record and date	Most recent record and date	Likelihood of occurrence	
					Prior to field assessment	Post field assessment[1]
Miniopterus orianae oceanensis Large Bent-winged Bat	BC Act: V	11	2.69 km (16/07/2007)	3.56 km (20/09/2018)	Moderate	Low. No caves on site.
Myotis macropus Southern Myotis	BC Act: V	1	5 km (16/02/2007)	5 km (16/02/2007)	Low	Moderate – permanent water adjacent to site.
Petauroides volans Greater Glider	EPBC Act: V	1	1.23 km (10/07/2015)	1.23 km (10/07/2015)	Low	Low
Petaurus australis Yellow-bellied Glider	BC Act: V	1	1.95 km (21/10/2011)	1.95 km (21/10/2011)	Low	Low
Phascolarctos cinereus Koala	BC Act: V EPBC Act: V	1	4.66 km (15/12/2005)	4.66 km (15/12/2005)	Low	Low
Pteropus poliocephalus Grey-headed Flying-fox	BC Act: V EPBC Act: V	14	0.32 km (3/11/2017)	1.69 km (17/02/2018)	Moderate	Moderate – foraging only
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	BC Act: V	5	3.56 km (19/09/2018)	3.56 km (19/09/2018)	Low	Moderate
Scoteanax rueppellii Greater Broad-nosed Bat	BC Act: V	1	4.31 km (5/11/2008)	4.31 km (5/11/2008)	Low	Low
KINGDOM: Plantae						

Scientific Name Common Name	Legal Status	Number of records	Closest record and date	Most recent record and date	Likelihood of occurrence	
					Prior to field assessment	Post field assessment[1]
Daphnandra johnsonii Illawarra Socketwood	BC Act: E EPBC Act: E	46	2.04 km (7/8/2018)	4.64 km (14/08/2018)	Low	Not present
Rhodamnia rubescens Scrub Turpentine	BC Act: E	3	4.41 km (6/02/2006)	4.86 km (1/07/2008)	Low	Not present
Zieria granulata Illawarra Zieria	BC Act: E EPBC Act: E	19	4.29 km (1/07/2012)	4.69 km (14/08/2018)	Low	Not present

Unless other stated, text is taken from the OEH Threatened Species (http://www.environment.nsw.gov.au/threatenedspecies/); Legal Status codes from the Atlas of NSW Wildlife: V = Vulnerable, E1 = Endangered, E2 = Endangered Population, C = China and Australia Migratory Bird Agreement (CAMBA), J = Japan and Australia Migratory Bird Agreement (JAMBA); K = Republic of Korea and Australia Migratory Bird Agreement (ROKAMBA), BC Act = *NSW Biodiversity Conservation Act 2016*, EPBC Act = *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*