



APPENDIX 4

Flora and Fauna Constraints Assessment

4 September 2017

Sam Al-Said
C/O SET Consultants
57 Blenheim Street
Croydon Park NSW 2133

Cc: Peter Dowse

Dear Sam

**Re: Flora and fauna constraints assessment for Lot 3 DP1018217, Dido Street Kiama
Project no. 25349**

Biosis Pty Ltd was commissioned by Set Consultants Pty Ltd to complete flora and fauna constraints assessment to describe the ecological values and constraints associated with development of Lot 3 DP1018217, Dido Street Kiama (the study area) (Figure 1).

Biosis understands that SET Consultants are investigating the potential constraints to the rezoning of land within the study area from RU1 Primary Production to R2 Low Density Residential. This ecological constraints assessment will accompany a rezoning application to Kiama Municipal Council, in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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 impacts of the project on any such species or their habitats, listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act).

Background

The study area is approximately 0.94 hectares and is defined as Lot 3 DP1018217, Dido Street Kiama. The study area is within Kiama Local Government Area (LGA). The surrounding land use includes low density residential dwelling to the east, rural land to the west and south, and a large lot dwelling to the north. Dense growing vegetation, surrounded by open rural land extends across the study area and to the west for approximately 500 metres. This area is isolated from other vegetation patches by rural land and low density residential development to the north and south east.

A Strahler Class 4 tributary of Spring Creek is located approximately 100 metres, downslope to the south of the study area, which flows north east into Spring Creek lagoon approximately 250 metres to the east of the study area.

Method

Database and literature review

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

- Commonwealth Department of the Environment and Energy (DEE) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Office of Environment and Heritage (OEH) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- NSW DPI WeedWise database for *Biosecurity Act, 2015* listed Priority listed weeds for the South East Local Land Services (LLS) area within the Kiama LGA region.
- Available vegetation mapping for the study area including:
 - *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands* (SCIV) (Tozer et al. 2010).

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

- *Environment Protection and Biodiversity Conservation Act 1999.*
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016.*
- *National Parks and Wildlife Act 1974* (NPW Act).
- *Biosecurity Act 2015* (Biosecurity Act).

Field investigation

A field investigation of the study area was undertaken on 9 August 2017 by Mathew Misdale (Botanist). Vegetation within the study area was surveyed using the random meander technique (Cropper 1993) over two person hours.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened biota previously recorded (OEH 2017) or predicted to occur (Commonwealth of Australia 2017) within five 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.

Results

The study area is located approximately 1.5 kilometres from Kiama town centre, in an area comprised of a range of land uses including low density residential, open rural land, and areas containing dense vegetation.

Regional mapping indicates that the study area occurs on the Bombo Soils Landscapes (Hazelton 1992). The Bombo soils landscape is characterised by rolling low hills with benched slopes on Bumbo latite. Bumbo latite was recorded within the study area and composition of the soil contributed to the closed vegetation recorded on site. This soils landscape is closely associated with rainforest communities within the locality.

The vegetation on site had been cleared previously and the majority of vegetation was regrowth forming a 'Closed Exotic Shrubland' of Broad-leaved Privet *Ligustrum lucidum* and African Olive *Olea europaea* var. *cuspidata*, with an occasional Sweet Pittosporum *Pittosporum undulatum* or Maiden's Wattle *Acacia maidenii*

present (Plate 2, Appendix 2). Where not dominated by shrubs, the vegetation was dominated by Kikuyu *Pennisetum clandestinum* and other pasture species (Plate 2, Appendix 2).

Threatened species

Background searches identified 13 threatened flora species and 79 threatened fauna species recorded (OEH 2017) or predicted to occur (DEE 2017) within 10 kilometres of the study area. In addition to previous records and distance from study area, regional geology maps (Hazleton 1992) and soils landscapes (e-Spade v2.0: <http://www.environment.nsw.gov.au/eSpade2WebApp>; Accessed 28/08/2017) were considered for potential threatened flora and threatened ecological community occurrence. Those species considered most likely to have habitat within the study area based on the background research are as follows:

- Flora
 - White-flowered Wax Plant *Cynanchum elegans* (Endangered, EPBC Act and BC Act).
 - Illawarra Socketwood *Daphnandra johnsonii* (Endangered, EPBC Act and BC Act).
 - *Solanum celatum* (Endangered, BC Act).
 - Illawarra Zieria *Zieria granulata* (Endangered, EPBC Act and BC Act).
- Fauna
 - Eastern Bentwing-bat *Miniopterus schreibersii oceanensis* (Vulnerable, BC Act).
 - Large-eared Pied Bat *Chalinolobus dwyeri* (Vulnerable, EPBC Act and BC Act).
 - Little Bentwing-bat *Miniopterus australis* (Vulnerable, BC Act).
 - Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).
 - Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable, EPBC Act and BC Act).
 - Powerful Owl *Ninox strenua* (Vulnerable, BC Act).
 - Barking Owl *Ninox connivens* (Vulnerable, BC Act).
 - Sooty Owl *Tyto tenebricosa* (Vulnerable, BC Act).
 - Rose-crowned Fruit-Dove *Ptilinopus regina* (Vulnerable, BC Act).
 - Superb Fruit-Dove *Ptilinopus superbus* (Vulnerable, BC Act).

An assessment of the habitat values of the study area is provided in Table 1 for threatened flora species and Table 2 for threatened fauna species.

Table 1 Assessment of habitat for threatened flora species

| Species | Local distribution and habitat requirements | Likelihood of occurrence or impact |
|---------------------------------|---|--|
| White-flowered Wax Plant | Has been recorded approximately 700 m from the study area. Usually found in dry rainforest with mainly low where volcanic soils or outcropping boulders of volcanic origin occur. | Habitat features are present, however the features are in low condition and subsequent field investigation did not detect the species. |
| Illawarra Socketwood | Has been recorded approximately 850 m from the study area. Occurs in rainforest within sheltered gullies or rocky slopes of boulders derived from latite. | Habitat features are present, however the features are in low condition and subsequent field investigation did not detect the species. |

| Species | Local distribution and habitat requirements | Likelihood of occurrence or impact |
|-------------------------------|--|--|
| <i>Solanum celatum</i> | Has been recorded within 1.5 km of the study area. It is usually present on rainforest edges or wet mesic forest. This species can be present in soil seed banks and re-establish following clearing of woody weeds. | Habitat features are present, however the features are in low condition and subsequent field investigation did not detect the species. |
| Illawarra Zieria | This species has been recorded 317 m from the study area. It usually occurs on shallow soils over latite on dry ridge tops. | Exposed latites were recorded within the study area. These areas were highly modified and dominated by Kikuyu. No plants were detected during field investigation. |

Based on the size of the study area, the survey effort is considered comprehensive for the flora species outlined in Table 1. Taking all of these factors into consideration, there is a low likelihood of occurrence for the above listed species.

Table 2 Assessment of habitat for threatened fauna species

| Habitat feature | Threatened fauna association | Likelihood of occurrence or impact |
|-------------------------------|--|--|
| General habitat values | <p>The vegetation was dominated by Broad Leaf Privet which would provide seasonal foraging resources for flying fauna (such as Grey-headed Flying-fox and frugivorous bird species).</p> <p>Forest vegetation within the study area may provide limited forage habitat as a component of a larger foraging range for the threatened owls. Non breeding Powerful Owl, Barking Owl and Sooty Owl may roost amongst dense vegetation on the site, however no breeding hollows are present.</p> <p>The area may provide foraging opportunities for microbats that prey upon insects above forested canopies.</p> | <p>No threatened fauna were recorded within the study area during site investigations. Based on the general habitat values present, there is a Medium or high likelihood of occurrence (foraging resources or occasional dispersal habitat only) within the study area for the following fauna:</p> <p>Medium</p> <ul style="list-style-type: none"> • Grey-headed Flying-fox • Powerful Owl • Masked Owl • Barking Owl • Sooty Owl • Rose-crowned Fruit-Dove • Superb Fruit-Dove • Large-eared Pied Bat • Eastern Bentwing-bat • Little Bentwing-bat <p>All other threatened fauna, excluding those mentioned below are considered to have a low likelihood to occur within the study area given the low number of records for these species in the locality and the absence of other important habitat features.</p> |
| Hollow-bearing | No hollow-bearing trees were recorded within the | N/A |

| Habitat feature | Threatened fauna association | Likelihood of occurrence or impact |
|---------------------------------|--|--|
| trees | study area. | |
| Rocky outcrops | Broad out-cropping rock in large sheets was noted in areas of the north western corner and boulders/ massive latite in the south western corner. | These may provide habitat for general reptilian fauna. |
| Waterways (creek, river or dam) | None recorded within the study area. | N/A |

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

Vegetation communities

Prior to the field investigation, Biosis confirmed that native vegetation communities, Sub-tropical Dry Rainforest, Estuarine Creekflat Scrub and Warm Temperate Layered Forest have been mapped in the broader landscape (Tozer et al 2010). Based on the available mapping the following Endangered Ecological Communities (EEC) have potential to occur on site:

- *Illawarra subtropical rainforest in the Sydney Basin Bioregion*, EEC, BC Act.
- *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions*, EEC, 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 threatened ecological communities (TECs) to determine presence or absence.

One small area of EEC in low condition was recorded in the study area. The structure, floristic composition and condition of this community is described in Table 3 and location is shown in Figure 2, Appendix 1.

Table 3 Threatened Ecological Communities within the study area

| Community | Description |
|---|---|
| <i>Illawarra Subtropical Rainforest EEC</i> (SR662 - Whalebone Tree - Native Quince dry subtropical rainforest) (Plate 1, Appendix 2). | 130 square metres of this vegetation was recorded in low condition, with the canopy dominated by Broad-leaved Privet <i>Ligustrum lucidum</i> . The ground surface was dominated by latite boulders and massive outcrops. This vegetation varied from the surrounding vegetation by also supporting species characteristic of the EEC including: Whalebone Tree <i>Streblus brunonianus</i> , Black Apple <i>Planchonella australis</i> , Veined Mock-olive <i>Notelaea venosa</i> and Native Holly <i>Alchornea ilicifolia</i> . The groundcover also supported <i>Arthropteris tenella</i> , Sickle Fern <i>Pellaea falcata</i> , Giant Maidenhair <i>Adiantum formosum</i> , and Settlers Flax <i>Gymnostachys anceps</i> . The vegetation to the west and south within the study area surrounding this vegetation type was mapped as Closed Exotic Shrubland, no other areas of the EEC were recorded within 10 m of the site. |

Priority weeds

The *Biosecurity Act 2015* (Biosecurity Act) came into effect as of 1 July 2017 and repeals the *Noxious Weeds Act 1993*. The Biosecurity Act outlines biosecurity risks and impacts, which in relation to the current assessment

includes those risks and impacts associated with weeds. A biosecurity risk is defined as the risk of a biosecurity impact occurring, which for weeds includes:

- The introduction, presence, spread or increase of a pest into or within the State or any part of the State.
- A pest plant has the potential to:
 - Out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight.
 - Harm or reduce biodiversity.

Two Priority Weeds for South East LLS which includes the Kiama Municipal Council, that have been recorded in the study area are listed in Table 4, along with their associated Duty.

Table 4 Priority weeds within the study area

| Scientific Name | Common Name | General Biosecurity Duty |
|-------------------------------|------------------|---|
| <i>Asparagus asparagoides</i> | Ground Asparagus | Mandatory Measure <i>Must not be imported into the State or sold.</i> |
| <i>Asparagus aethiopicus</i> | Ground Asparagus | Mandatory Measure <i>Must not be imported into the State or sold.</i> |

Conclusion and recommendations

The majority of the study area (0.94 hectares) contains mainly exotic vegetation in low condition not listed under state or federal biodiversity legislation. These areas shown in Figure 2 represent a low constraint to development.

The implementation of the BC Act on 26 August 2017 requires the development proponent to assess any potential impacts to threatened biota against the Acts impact thresholds. Impacts above the threshold levels require the preparation of a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) and are likely to require offsets for impacted threatened biota as determined by the BioBanking Scheme Offsets calculator.

Based on the field investigations, the site supports a small area of Illawarra Subtropical Rainforest EEC which is a high constraint to develop. The study area also has a medium potential to be used by a number of highly mobile threatened fauna as non-limiting foraging and dispersal habitat. A summary of impact assessment required for subdivision and future development of the study area is included within Table 5.

Table 5 Assessment under the BC Act

| Criteria | Threshold | Subject site | BDAR/ SIS required |
|-------------------------------------|--|-------------------------------------|---|
| Vegetation clearing | Potential threshold: 0.25 hectares (min lot size less than one hectare) | 130 square metres (0.013 hectares). | Total clearing of EEC would be below the threshold and not require SIS or BDAR. |
| Biodiversity Values Map | Occurs within layer | No | No |
| Significance test for impact | Significant Impact | Required to assess direct or | Clearing is unlikely to |

| | | | |
|--------------------------------|---|---|--|
| (Section 7.3 of BC Act) | Assessment under Section 7.3 of the BC Act (5 Part Test) for impacts to threatened biota. | indirect impacts to Illawarra Subtropical Rainforest EEC. Threatened fauna unlikely to be impacted, no 5-Part Test required. | result in significant impact, therefore BDAR not required. Preparation of a flora and fauna impact assessment should accompany subdivision Development Application. |
|--------------------------------|---|---|--|

Direct impacts that are recommended to be avoided include:

- Clearing 130 square metres of the EEC
- Site any stormwater easements or outflows away from the EEC
- Install any bushfire Asset Protection Zones (APZs) outside of the EEC.

Biosis recommends that where feasible, the EEC remnant be retained within a park/ green space with a minimum 10 metre buffer between the EEC and any proposed development features. If the EEC is retained the consent authority are likely to require a vegetation management plan to improve and provide ongoing management.

The constraints and further detailed recommendations for planning the development of the study area are outlined in Table 6.

Table 6 Ecological features of the study area and constraints

| Ecological feature | Constraint | Recommendations |
|--|------------|--|
| 130 square metres of Illawarra Subtropical Rainforest EEC listed under the BC Act | High | BC Act listed EECs: <ul style="list-style-type: none"> • Establish a minimum 10 m buffer zone around the EECs and ensure no development or impacts occur in these areas. • Ensure APZs do not encroach on EECs, however are appropriate to be installed within the 10 m buffer zone. • Minimise indirect impacts from stormwater management by ensuring there are no unacceptable changes in hydrology to areas of EEC. • Implement appropriate safeguards during the construction phase to avoid accidental harm or indirect impacts from stormwater run-off and sedimentation. This would involve exclusion barriers to avoid accidental damage from mobile plant and pedestrian traffic. • Complete a 5 – Part Test impact assessment under Section 7.3 of the BC Act for EEC as part of a flora and fauna assessment to be submitted with a development application to subdivide the study area. • Undertake enhancement plantings of areas between the EECs to provide a buffer between the EEC and proposed development areas. |
| Other vegetation and fauna habitat impacts | Low | General avoidance measures to be considered include: <ul style="list-style-type: none"> • Retention of native trees where feasible. |

| Ecological feature | Constraint | Recommendations |
|---|----------------|--|
| | | <ul style="list-style-type: none"> Utilisation of appropriate protocols to check for the presence of fauna (nests, drays or roosting species) prior to tree or vegetation removal. |
| On-going management of the residual vegetation, including the EEC. | Not Applicable | <ul style="list-style-type: none"> A Vegetation Management Plan (VMP) will be required for the areas of EEC, buffer vegetation. |
| Priority Weed control (Bridal Creeper and Ground Asparagus) | Low | <p>The presence of these weeds does not represent a significant constraint to development, but any vegetation removal or soil movement from the study area should provide adequate controls for avoiding spreading these weeds.</p> <p>General controls will include:</p> <ul style="list-style-type: none"> Management of soil movement and erosion control to reduce the potential for movement of weed seed or propagules onto or off the site. <p>Control for these plants should be undertaken prior to construction and be detailed within a site specific VMP.</p> <p>Pre-treatment of these weeds is an option that must be undertaken in accordance with NSW DPI (2014).</p> |

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



Mathew Misdale

Botanist

References

- DEE 2017. Protected Matters Search Tool. Australian Government Department of the Environment, Water, Heritage & the Arts, Canberra. Accessed 08/08/2017 at <https://www.environment.gov.au/epbc/protected-matters-search-tool>
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- Tozer MG, Turner K, Keith DA, Tindall D, Pennay C, Simpson C, MacKenzie B, Beukers P 2010. *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands*. Cunninghamia 11, 359-406.

Appendices

Appendix 1 Figures

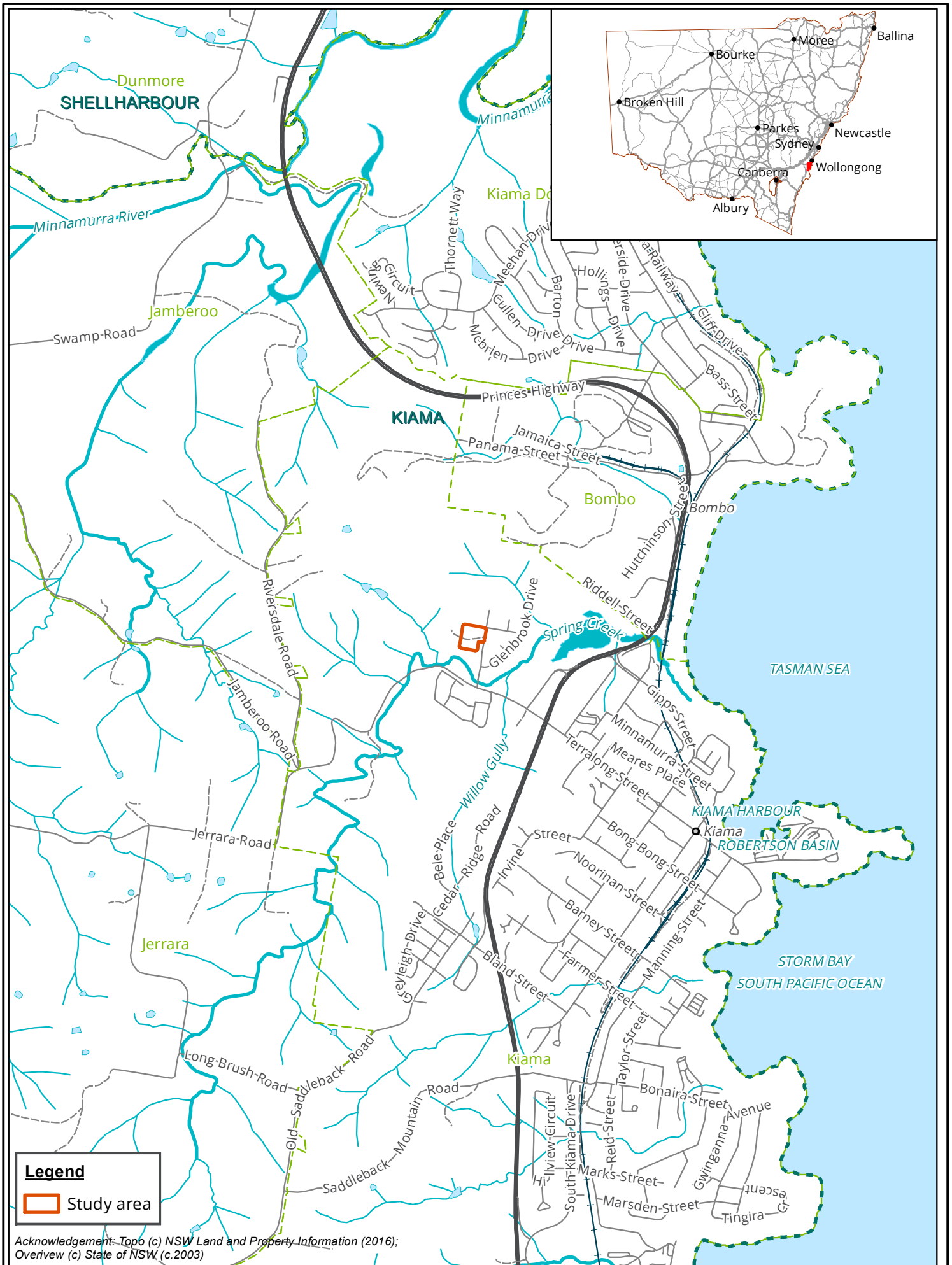
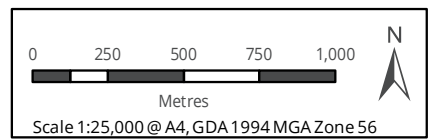


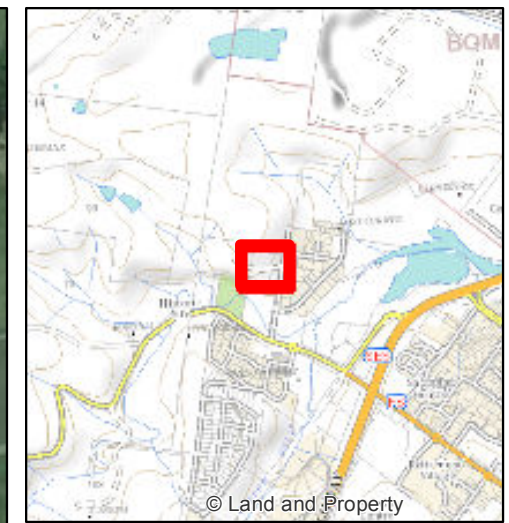
Figure 1: Location of the study area



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Matter: 25349
 Date: 14 August 2017,
 Checked by: MJM, Drawn by: JMS, Last edited by: jshepherd
 Location: P:\25300s\25349\mapping\





Legend








-  Study
-  Subject
- Vegetation communities**
-  Closed exotic grassland
-  Closed exotic shrubland
-  Managed residential gardens
-  SR662 - Whalebone Tree - Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion
- Other features**
-  Road

Figure 2: Ecological features of the study area

0 5 10 15 20 25
 Metres
 Scale: 1:500 @ A3
 Coordinate System: GDA 1994 MGA Zone 56



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Appendix 2 Plates



Plate 1 – Illawarra Subtropical Rainforest EEC



Plate 2 Closed Exotic Shrubland



Plate 3 **Closed Exotic Grassland and exposed massive latite**