



## **BIODIVERSITY ASSESSMENT REPORT**

**LOT 10 DP 878167  
50 WYLLIE ROAD  
KEMBLA GRANGE**

**APRIL 2014  
REF: 4039**

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**APRIL 2014**

### **Conacher Consulting Pty Ltd**

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<b>Project Manager</b>	Jacob Manners

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## EXECUTIVE SUMMARY

### ***Project Background and Assessment Aims***

This report has been prepared as part of an Environmental Impact Statement for the proposed upgrade to the Kembla Grange Resource Recovery Facility at Lot 10 DP 878167, 50 Wyllie Road, Kembla Grange.

The proposed development has been declared a State Significant Development (SSD 5300) and approval is required under Part 4 of the *Environmental Planning and Assessment Act* (1979) (EP&A Act). Accordingly this report has been prepared to identify the biodiversity characteristics of the site and address the biodiversity matters identified in the Director-General's Environmental Assessment Requirements (DGR's) from the NSW Government Department of Planning and Infrastructure with regard to critical habitats (including riparian habitat and groundwater dependent ecosystems), threatened species, populations, ecological communities and native vegetation.

### ***Identification of Biodiversity Present***

A review of available literature and database records for the study area was undertaken to obtain reference material and background information. Biodiversity surveys were conducted generally in accordance with the guidelines provided by DECC (2004) during April 2013 and February 2014.

Flora surveys included the application of the following standard survey methodologies:

- Sampling of 400m<sup>2</sup> quadrats;
- Sampling of 100m long transects; and
- Targeted meander searches.

Surveys for vertebrate fauna species included the application of the following standard methodologies:

- Diurnal Habitat Search and Area Searches;
- Night Habitat Search and Spotlighting;
- Nocturnal Call Playback surveys;
- Night Watercourse Searches;
- Stag watching;
- Arboreal Elliot Trapping;
- Terrestrial Elliot Trapping;
- Wire Cage Trapping;
- Searches for Scats and Signs;
- Ultrasonic Call Recording; and
- Opportunistic Observation and/or Call Recognition surveys.

### ***Biodiversity Characteristics of the Site***

The site encompasses an area of approximately 21.8 hectares and is located on the foothills of the Illawarra Escarpment within the Wollongong local government area in the Sydney Basin bioregion.

The surveys undertaken identified the presence of disturbed habitats consisting of mostly Cleared Land and Regrowth Acacia and Exotic Shrubs. Small patches of Disturbed Subtropical Rainforest (commensurate with the Illawarra Subtropical Rainforest in the Sydney Basin Bioregion endangered ecological community) and Disturbed Red Gum Forest (commensurate with the Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion endangered ecological community) were identified in the northern upper slope sections of the site.

The Grey-headed Flying-fox (*Pteropus poliocephalus*), was observed during surveys, this species is listed as threatened within the *EPBC Act* (1999) and the *TSC Act* (1995).

The Black-faced Monarch (*Monarcha melanopsis*), was observed during surveys, this species is listed as migratory within the *EPBC Act* (1999).

No threatened flora species or endangered populations were observed within the subject site during surveys.

Riparian and aquatic habitats are present within the watercourse which intersects the site and vegetation with low potential for groundwater interaction is present within the northern sections of the site (Disturbed Red Gum Forest and Disturbed Subtropical Rainforest).

### ***Evaluation of Potential Impacts***

The proposed development will occupy the existing disturbed areas of the site which contain Cleared Land and a relatively small area of Regrowth Acacia with Exotic Shrub vegetation. The occurrences of Disturbed Subtropical Rainforest and Disturbed Red Gum Forest present will be retained within the site.

As the proposed development footprint areas will be mostly restricted to highly disturbed habitats, the potential for impacts associated with fragmentation of the existing wildlife connectivity, wildlife injury and mortality, spread of weeds and pathogens, and light pollution are considered to be low. Further potential biodiversity impacts associated with water quality degradation, noise and vibration, dust and pollution, groundwater contamination and cumulative impacts will be mitigated through the implementation of amelioration and avoidance measures.

### ***Amelioration Measures Proposed***

The following key amelioration and impact avoidance measures are proposed:

- Retention of remnant intact native vegetation / endangered ecological communities;
- Retention of hollow bearing trees;
- Installation of protective fencing for retained vegetation;
- Retention and management of a 10 metre wide vegetation riparian corridor as a buffer between the development and the watercourse which intersects the site in accordance with the Vegetation Management Plan prepared by Southern Habitat (2013);
- Revegetation of disturbed batters and landscape areas with native flora species;
- Removal of foreign vegetative matter from earth moving machinery prior to entering vegetated areas of the site;
- Rapid revegetation and/or stabilisation of disturbed areas;
- Diversion of stormwater and runoff from the processing and stockpile areas of the site to a water quality / recycling pond;
- Provision and use of chemical spill kits and compaction of the works area with road base and clay to prevent potential contamination of groundwater and aquatic areas;
- Maintenance of machinery to comply with exhaust noise and vibration standards;
- Adherence to approved hours of operation / works;
- Suppression of raised dust through installation and use of a sprinkler system; and
- Prevention and removal of wind-blown rubbish.

### ***Significance Assessments***

Significance assessments were undertaken for biodiversity listed within the *EPBC Act* (1999), the *TSC Act* (1995) and the *FM Act* (1994). These assessments determined that the proposal is not likely to have a significant impact on a Matter of National Environmental Significance according to the criteria provided in the AGDE (2013) Significant Impact Guidelines or a significant impact on threatened species, populations or ecological communities or their habitats in accordance with Section 5A of the *EP&A Act* (1979). Further assessments and/or approvals under State Environmental Planning Policies 14, 19, 26 or 44 are not required.

It is considered that the proposal will maintain or improve biodiversity values within the site and locality with regard to native vegetation and habitats, aquatic habitats and groundwater dependant ecosystems.

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## TABLE OF CONTENTS

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<b>EXECUTIVE SUMMARY</b>	<b>Page</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
1.1 Background .....	1
1.2 Proposed Development .....	1
1.3 Study Area .....	1
1.4 Legislative Context.....	1
1.5 Study Aims .....	2
<b>2. METHODOLOGY.....</b>	<b>3</b>
2.1 Database Searches and Literature Reviews .....	3
2.2 Field Survey Techniques and Effort.....	11
2.3 Survey Limitations .....	20
<b>3. EXISTING ENVIRONMENT.....</b>	<b>21</b>
3.1 Landscape Context .....	21
3.2 Existing Land Use .....	21
3.3 Vegetation Communities, Flora & Fauna species and Habitat .....	21
3.4 Threatened Biodiversity .....	38
3.5 Critical Habitats .....	58
3.6 Listed Migratory Species.....	58
3.7 Habitat Linkages .....	59
3.8 Aquatic and Riparian Habitats .....	61
3.9 Groundwater Dependent Ecosystems .....	62
<b>4. EVALUATION OF BIODIVERSITY IMPACTS.....</b>	<b>65</b>
4.1 Loss of Vegetation/Habitats .....	65
4.2 Habitat Fragmentation and Isolation .....	65
4.3 Injury and Mortality.....	65
4.4 Exotic Flora Species .....	65
4.5 Pests and Pathogens .....	66
4.6 Hydrology and Aquatic Habitats.....	66
4.7 Groundwater Dependent Ecosystems .....	66
4.8 Noise, Vibration and Light.....	66
4.9 Dust and Pollution .....	66
4.10 Cumulative Impacts.....	67
<b>5. AMELIORATION MEASURES.....</b>	<b>69</b>
<b>6. SIGNIFICANCE ASSESSMENTS.....</b>	<b>71</b>
6.1 EPBC Act Assessment .....	71
6.2 EP&A Act Assessment of Significance .....	73
6.3 State Environmental Planning Policies .....	88
6.4 Native Vegetation Impact Assessment .....	89
6.5 Aquatic Habitat Impact Assessment .....	90
6.6 Groundwater Dependant Ecosystem Impact Assessment .....	90
<b>7. CONCLUSIONS.....</b>	<b>93</b>
<b>8. REFERENCES.....</b>	<b>94</b>
<b>APPENDIX 1</b> Weather Conditions During Survey Periods	
<b>APPENDIX 2</b> EPBC Act Significant Impact Assessment	

<b>FIGURES</b>	<b>Page</b>
Figure 2.1 Threatened Flora Recorded within 10km .....	4
Figure 2.2A Threatened Amphibians & Reptiles Recorded within 10km .....	5
Figure 2.2B Threatened Birds Recorded within 10km .....	6
Figure 2.2C Threatened Mammals Recorded within 10km .....	7
Figure 2.3 Endangered Populations Recorded within 10km .....	8
Figure 2.4 Endangered Ecological Communities Recorded within 10km .....	9
Figure 2.5 Listed Migratory Species Recorded within 10km .....	10
Figure 2.6 Flora Survey & Vegetation Communities Locations .....	13
Figure 2.7 Fauna Survey Locations .....	19
Figure 3.1 Vegetation Community Locations .....	29
Figure 3.2 Fauna Habitat Locations .....	33
Figure 3.3 Endangered Ecological Community Locations .....	39
Figure 3.4 Habitat Linkage .....	56
Figure 3.5 Groundwater Dependant Ecosystem .....	60
Figure 4.1 Proposed Development Footprint .....	64

## 1. INTRODUCTION

### 1.1 Background

*Conacher Environmental Group* has been engaged to prepare a Biodiversity Assessment Report as part of an Environmental Impact Statement for the Kembla Grange Resource Recovery Facility State Significant Project at Lot 10 DP 878167, 50 Wyllie Road, Kembla Grange.

This report has been prepared to address the biodiversity matters identified in the Director-General's Environmental Assessment Requirements (DGR's) from the NSW Government Department of Planning and Infrastructure, for the Kembla Grange Resource Recovery Facility, Wollongong (SSD - 5300). This report provides details on impacts on critical habitats (including riparian habitat and groundwater dependent ecosystems), threatened species, populations, ecological communities and native vegetation.

### 1.2 Proposed Development

The proposed development is for an upgrade to the existing Kembla Grange Resource Recovery Facility which includes:

- Increase in processing capacity of up to 230, 000 tonnes per annum of waste and materials;
- Waste storage and stockpile areas; and
- Ancillary infrastructure including plant and equipment, sheds, office and workshop buildings and an on-site stormwater detention pond.

As part of the proposal, a 10 metre vegetated riparian corridor will be retained and managed in accordance with the Vegetation Management Plan prepared by Southern Habitat (2013) and areas of endangered ecological communities will be retained.

Detailed plans of the proposal have been provided as separate documentation to this report.

### 1.3 Study Area

The planning and cadastral details of the subject site are provided in Table 1.1.

TABLE 1.1 SITE DETAILS	
Location	Lot 10 DP 878167, 50 Wyllie Road, Kembla Grange
Site Area	Approximately 21.8 hectares
Grid Reference	299175E 6184170N
Local Government Area	Wollongong
Bioregion	Sydney Basin
Existing Land Use	Resource recovery facility and vacant land.
Current Zoning	IN2 Light Industrial / RE2 Private Recreation
Proposed Development	Expansion of the existing resource recovery facility

### 1.4 Legislative Context

#### 1.4.1 Commonwealth Legislation

##### ***Environmental Protection and Biodiversity Conservation Act 1999***

The *Environment Protection and Biodiversity Conservation Act*, (1999) requires that Commonwealth approval be obtained for certain actions. The Act provides an assessment and approvals systems for actions that have a significant impact on matters of National Environment Significance (NES).

Where a proposed activity is located in an area identified to be of National Environmental Significance, or such that it is likely to significantly impact a matter of National Environmental



Significance, the proposal needs to be referred to the Australian Government Department of the Environment (AGDE).

#### **1.4.2 State Legislation**

##### ***Environmental Planning and Assessment Act 1979***

The proposed development has been declared a State Significant Development (SSD 5300) and approval is required under Part 4 of the *Environmental Planning and Assessment Act* (1979) (EP&A Act). The Minister is the consent authority and is required to take into consideration the relevant likely impacts of the development specified under Section 79C of the Act, including environmental impacts on the natural environment in the locality.

The likely impacts of the proposed development on biodiversity are required to be addressed in accordance with the Director General's Requirements issued for the proposal, including an assessment of significance in accordance with Section 5A of the *EP&A Act* (1979) to determine whether the proposal will have a significant impact on threatened species, populations or ecological communities or their habitats.

##### ***Threatened Species Conservation Act 1995***

The *Threatened Species Conservation Act* (1995) (TSC Act) aims to conserve threatened flora and fauna species, endangered populations and endangered ecological communities and their habitats within NSW (excluding fish and marine plants which are protected by the *Fisheries Management Act* 1994). The Act also lists declared critical habitat, key threatening processes and allows for the preparation of Recovery Plans and Threat Abatement Plans.

##### ***Fisheries Management Act (1994)***

The Fisheries Management Act (1994) (FM Act) aims to conserve threatened aquatic flora and fauna species, populations and endangered ecological communities and their habitats within NSW. The Act also lists declared critical habitat, key threatening processes and allows for the preparation of Recovery Plans and Threat Abatement Plans.

##### ***State Environmental Planning Policies***

The following State Environmental Planning Policies, relevant to biodiversity matters have been addressed for the proposed development:

- SEPP 14 - Coastal Wetlands;
- SEPP 19 – Bushland in Urban Areas;
- SEPP 26 - Littoral Rainforest; and
- SEPP 44 - Koala Habitat Assessment.

#### **1.5 Study Aims**

This Report has been prepared by *Conacher Environmental Group* to identify the biodiversity characteristics of land within the subject site.

This Report provides an assessment of existing habitats and the potential for the proposed development to significantly impact on migratory species and threatened species and ecological listed within the *EPBC Act* (1999) and an assessment in accordance with Section 5A of the *EP&A Act* (1999), of the potential for the proposal to have a significant effect on threatened species, populations and ecological communities listed within the *TSC Act* (1995) or the *FM Act* (1994).

This report also provides an assessment of the potential impacts on native vegetation, riparian habitats and groundwater dependant ecosystems.

## 2. METHODOLOGY

### 2.1 Database Searches and Literature Reviews

A review of available literature for the area was undertaken to obtain reference material and background information for this study. The following main documents were accessed as part of the literature review for this study:

- Illawarra Draft Biodiversity Strategy  
(Wollongong City Council, Shellharbour City Council and Kiama Municipal Council 2010)
- Bioregional Assessment Study Part 1 - Native Vegetation of the Illawarra Escarpment and Coastal Plain  
(NSW National Parks and Wildlife Service 2002)
- Bioregional Assessment Study Part 2 – Fauna of the Illawarra Escarpment, Coastal Plain and Plateau  
(NSW National Parks and Wildlife Service 2002)
- Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands  
(Tozer *et al.*, 2010)

Database searches were conducted to provide background information and identify records of listed threatened and migratory species located within 10km of the site. The databases searched are listed in Table 2.1.

<b>TABLE 2.1 DATABASE SEARCHES CONDUCTED</b>			
<b>Database Searched</b>	<b>Purpose of Search</b>	<b>Date Viewed</b>	<b>Reference</b>
Bionet Atlas of NSW Wildlife	Identify threatened species records within 10km of the site	6 March 2014	NSW OEH 2014a
EPBC Protected Matters Search Tool	Identify threatened and migratory species records within 10km of the site	6 March 2014	AGDE 2014
OEH Vegetation Types Database	Identify corresponding vegetation types	6 March 2014	NSW OEH 2014b
OEH Biobanking Threatened Species Profile Database	Identify profiles for relevant threatened species	6 March 2014	NSW OEH 2014b
NSW Primary Industries Fishing and Aqua Culture - Records Viewer	Identify threatened aquatic species records within 10km of the subject site	6 March 2014	NSW DPI 2014a
Atlas of Groundwater Dependant Ecosystems	Identify the presence of groundwater dependant ecosystems within 5km of the site.	6 March 2014	Aust Gov BOM 2014
Noxious Weed Declarations database	Identify noxious weeds for the Wollongong LGA	6 March 2014	NSW DPI 2014b

The locations of records threatened and migratory species and populations identified within 10 km of the site from the Bionet Atlas of NSW Wildlife (NSW OEH 2014) and the locations of endangered ecological communities identified within 10 km of the site from vegetation mapping undertaken by NPWS (2002) are shown in the following figures:

Figure 2.1: Threatened Flora Species Recorded within 10 km;

Figure 2.2-A: Threatened Fauna Species / Amphibians and Reptiles Recorded within 10 km;

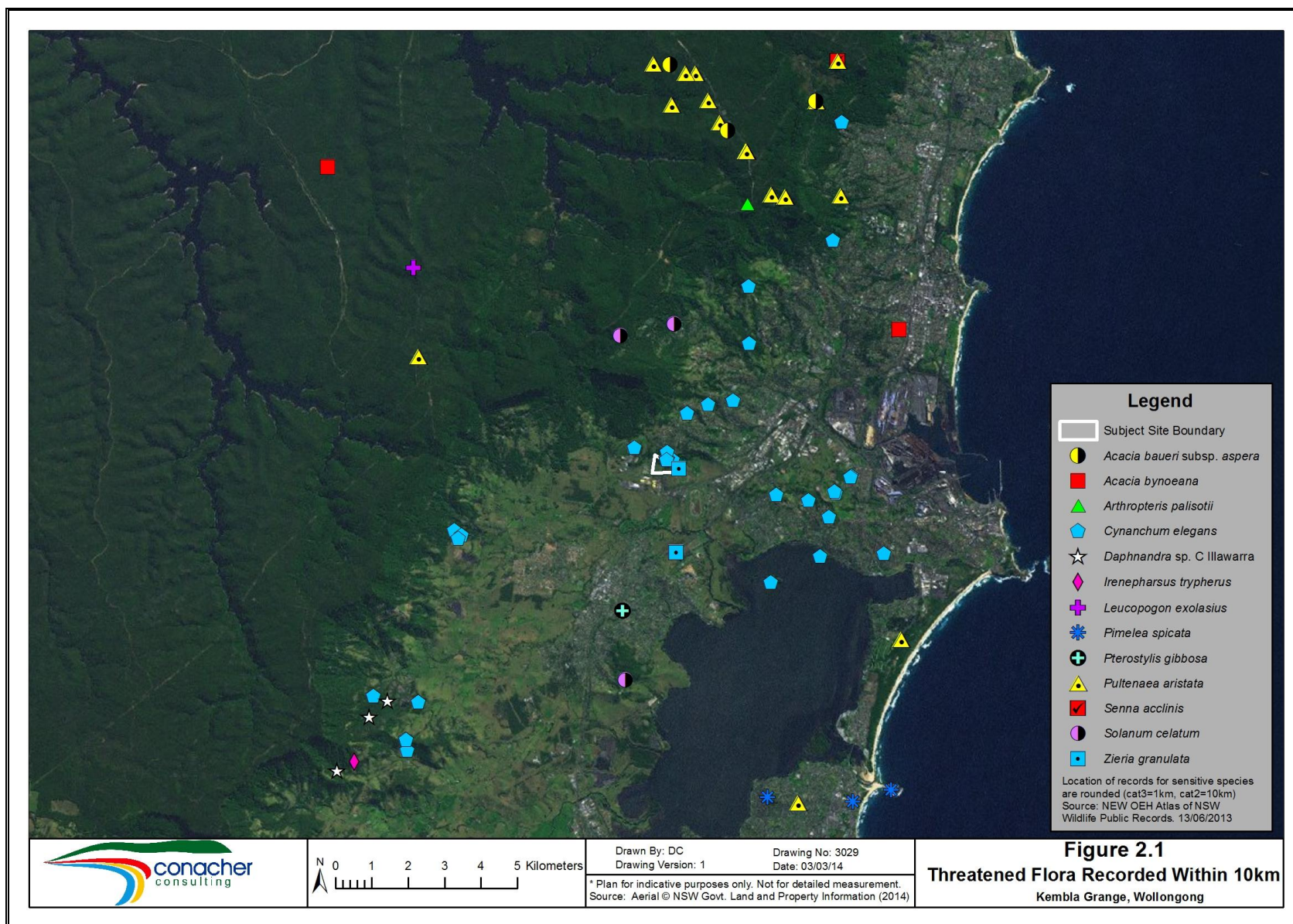
Figure 2.2-B: Threatened Fauna Species / Birds Recorded within 10 km;

Figure 2.2-C: Threatened Fauna Species / Mammals Recorded within 10 km;

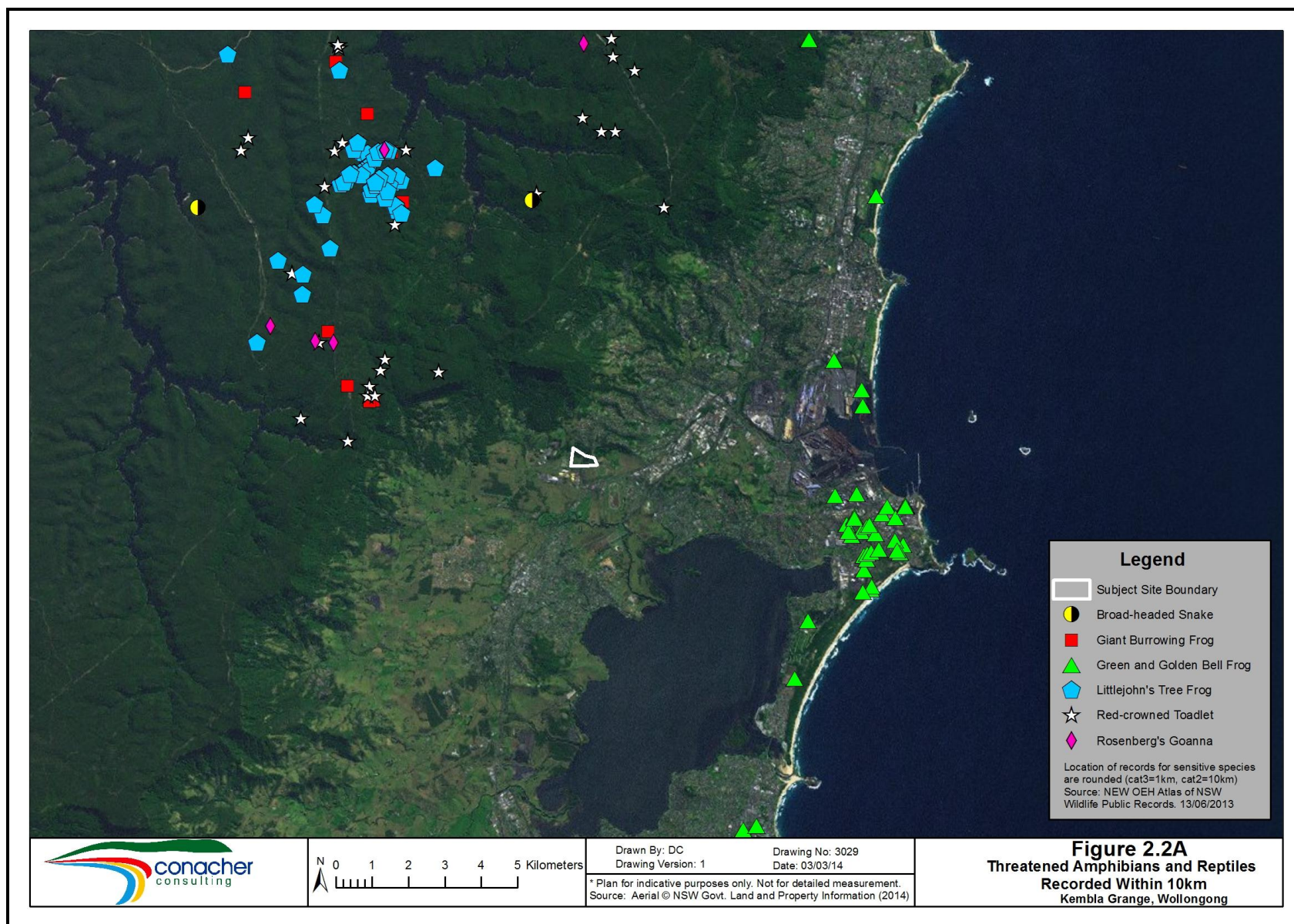
Figure 2.3: Threatened Populations Recorded within 10 km;

Figure 2.4: Endangered Ecological Communities Recorded within 10 km;

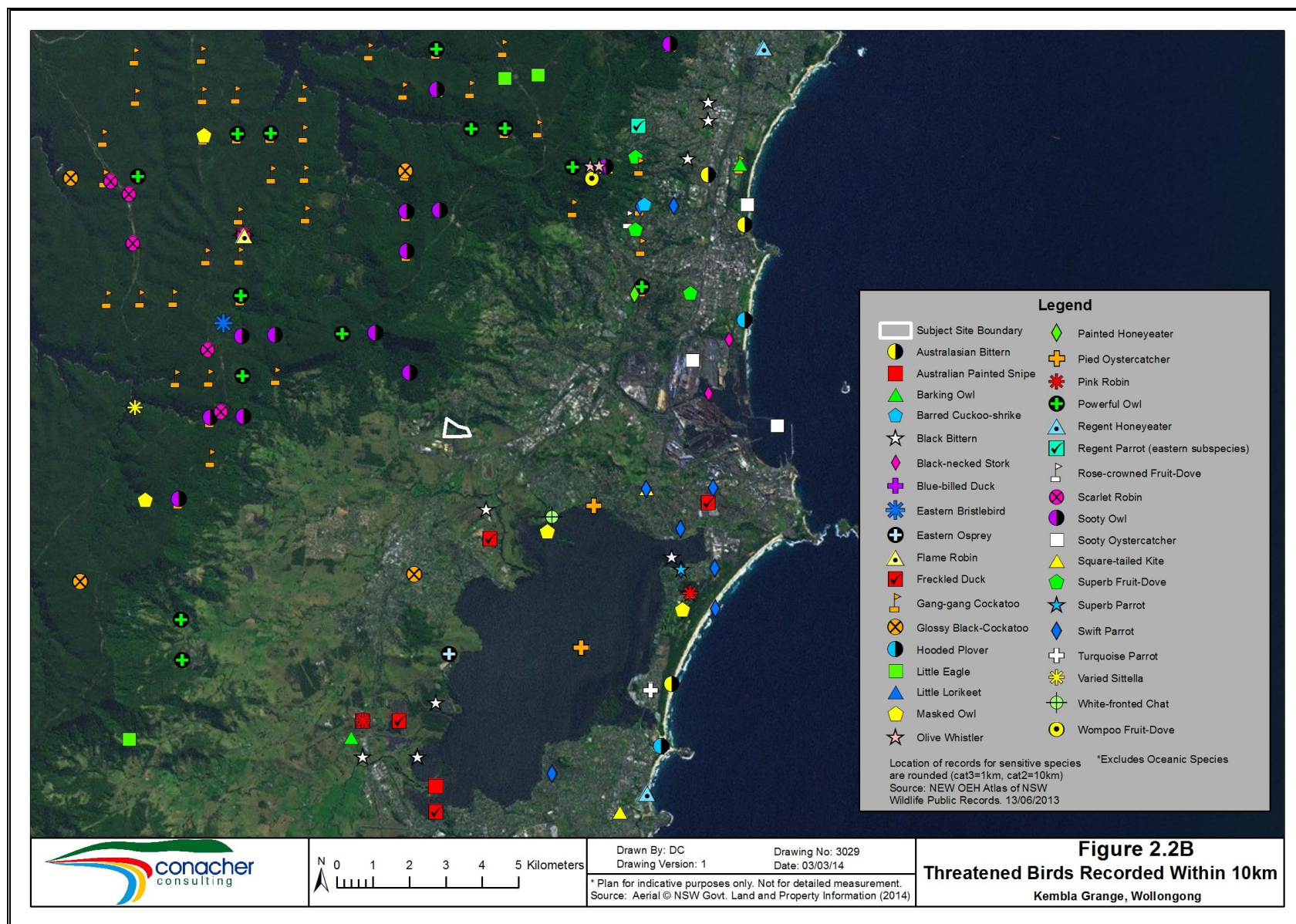
Figure 2.5: Migratory Species Recorded within 10 km.



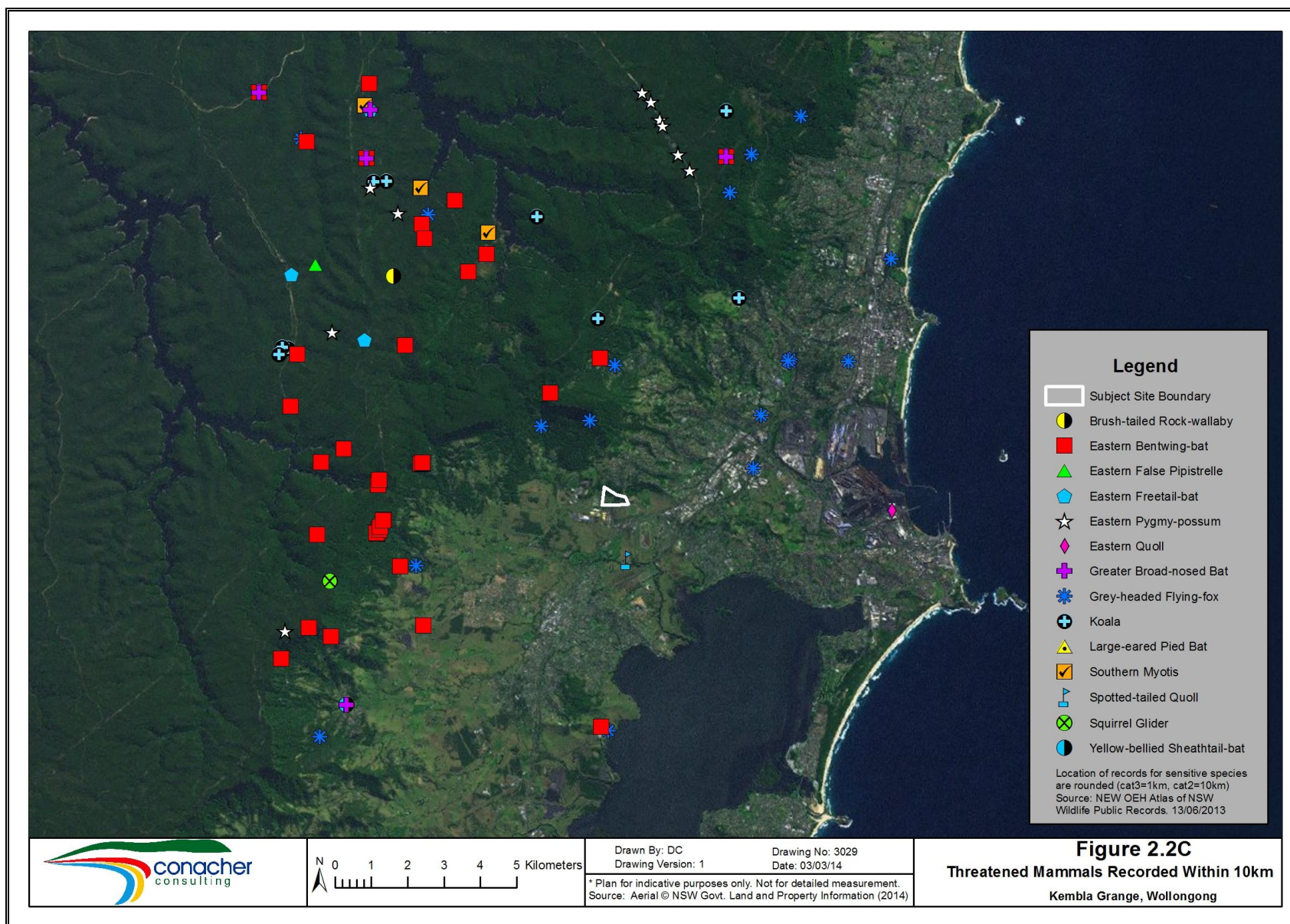




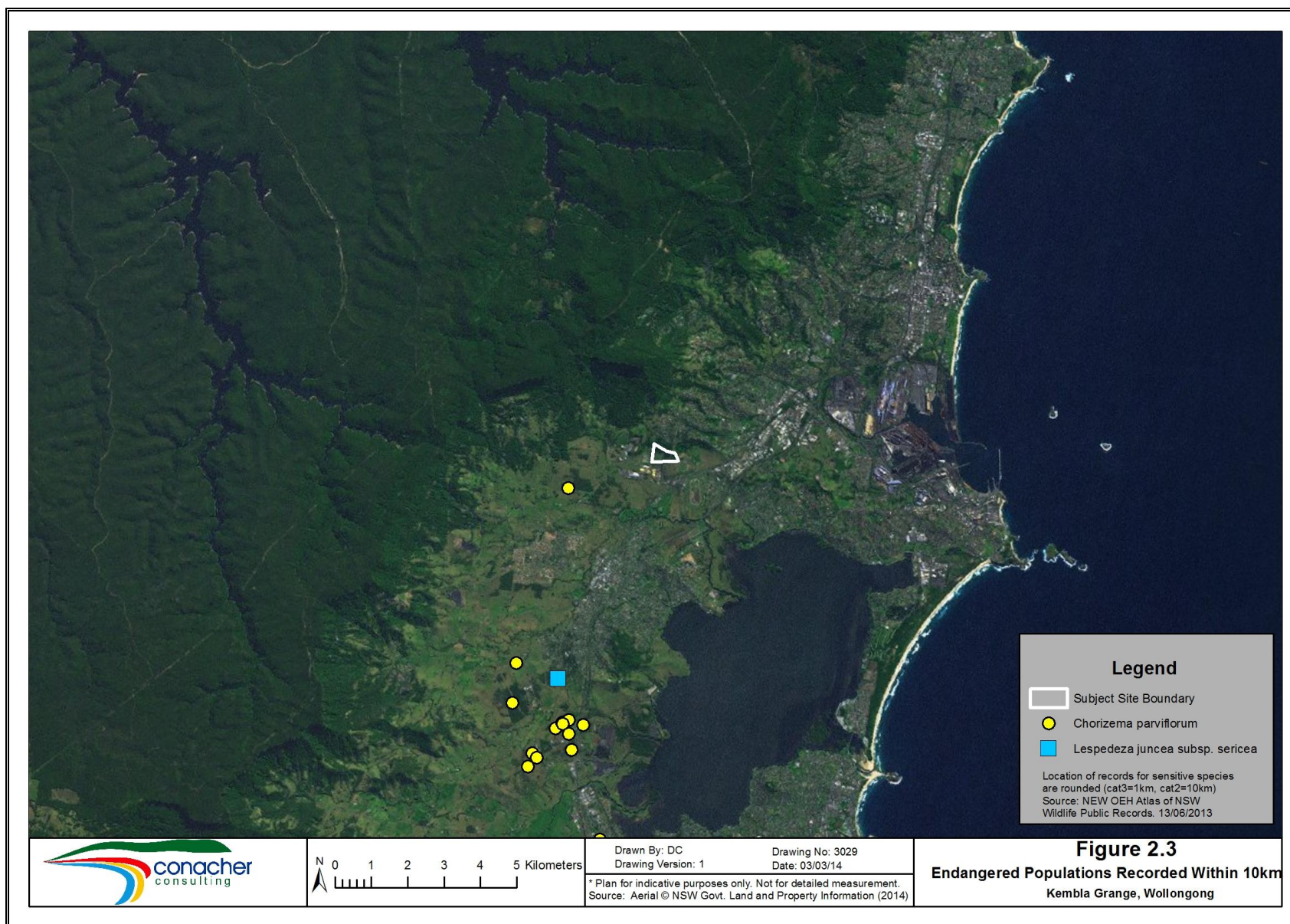




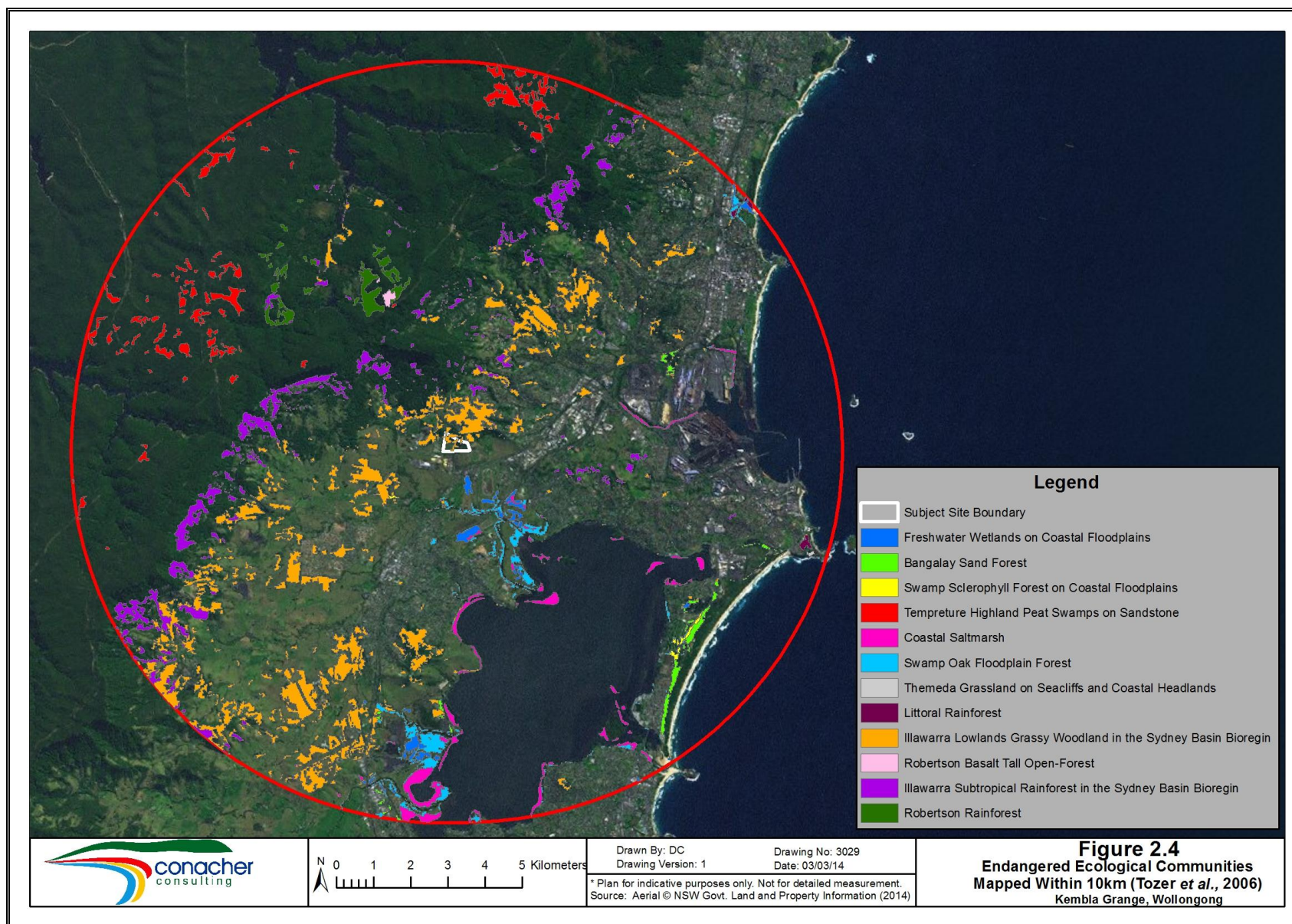




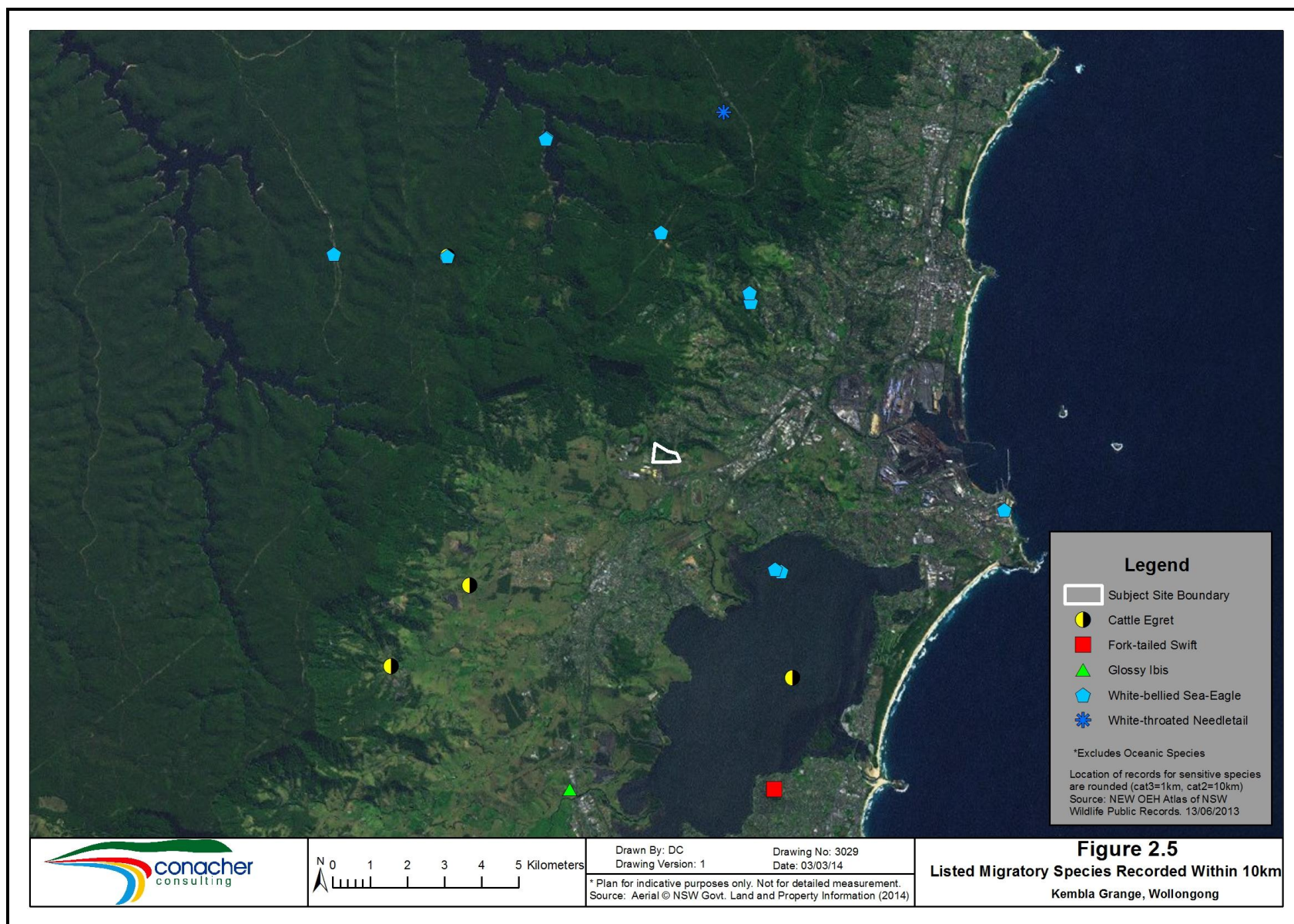












## 2.2 Field Survey Techniques and Effort

### 2.2.1 Flora Field Surveys

#### ***Flora Field Survey Techniques***

To determine the likely and actual occurrence of flora species and plant communities on the subject site, field survey work was undertaken to supplement literature reviews and previous flora surveys of the area. The methods utilised for the flora survey are outlined as follows.

- Aerial photographs were utilised to identify the extent of vegetation with respect to the site and surrounding areas
- A field survey which consisted of foot traverses within vegetated areas was conducted according to Cropper (1993) to identify the occurrence of flora species and the extent and location of vegetation communities present across the subject site and to determine the positioning of more intensive survey locations.
- Flora surveys were undertaken generally incorporating the methodologies and stratification guidelines outlined in DEC (2004).
- Flora survey locations are shown in Figure 2.6.
- Five flora quadrats were surveyed within the subject site. Quadrats were approximately 400m<sup>2</sup> in size and were searched on foot with recording of all flora species within the quadrat. Quadrat and transect surveys were undertaken on
- Three vegetation transects were surveyed within the subject site. Transects were approximately 100m long and were traversed on foot with observation and recording of all species occurring within 2m of the transect.
- Flora quadrat and transect surveys were undertaken on 30 April 2013.
- A cover abundance score for each species observed during plot based surveys was recorded utilising a modified Braun-Blanquet scale.
- Meander searches were conducted across the site to enable targeted searches of rare and threatened flora species and to identify the location and composition of vegetation communities.
- Meander searches for threatened flora species were undertaken on 22, 23, 24, 25 and 30 April 2013 and 26 and 27 February 2014. The total time taken conducting meander searches was six hours, further details are provided in Table 2.2.
- Flora survey locations are shown in Figure 2.6.
- Specimens of plants not readily identified in the field were collected for identification.
- Specimens of plants tentatively identified as threatened species are sent to the Sydney Royal Botanic Gardens for confirmation of the identification.
- All vascular plants were identified from local knowledge or by using the online keys and nomenclature of Royal Botanic Gardens and Domain Trust (2014).
- Initial identification of vegetation communities was undertaken in accordance with the formations and classes of Keith (2004) with classification undertaken according to species composition and the structural descriptions of *Specht et. al.* (1995).
- Corresponding units of available vegetation mapping are identified where available.

- Corresponding Endangered Ecological Communities listed on both the *TSC Act* (1995), *FM Act* (1994) and *Environmental Protection and Biodiversity Conservation Act* (1999) (EPBC) are also provided if relevant.

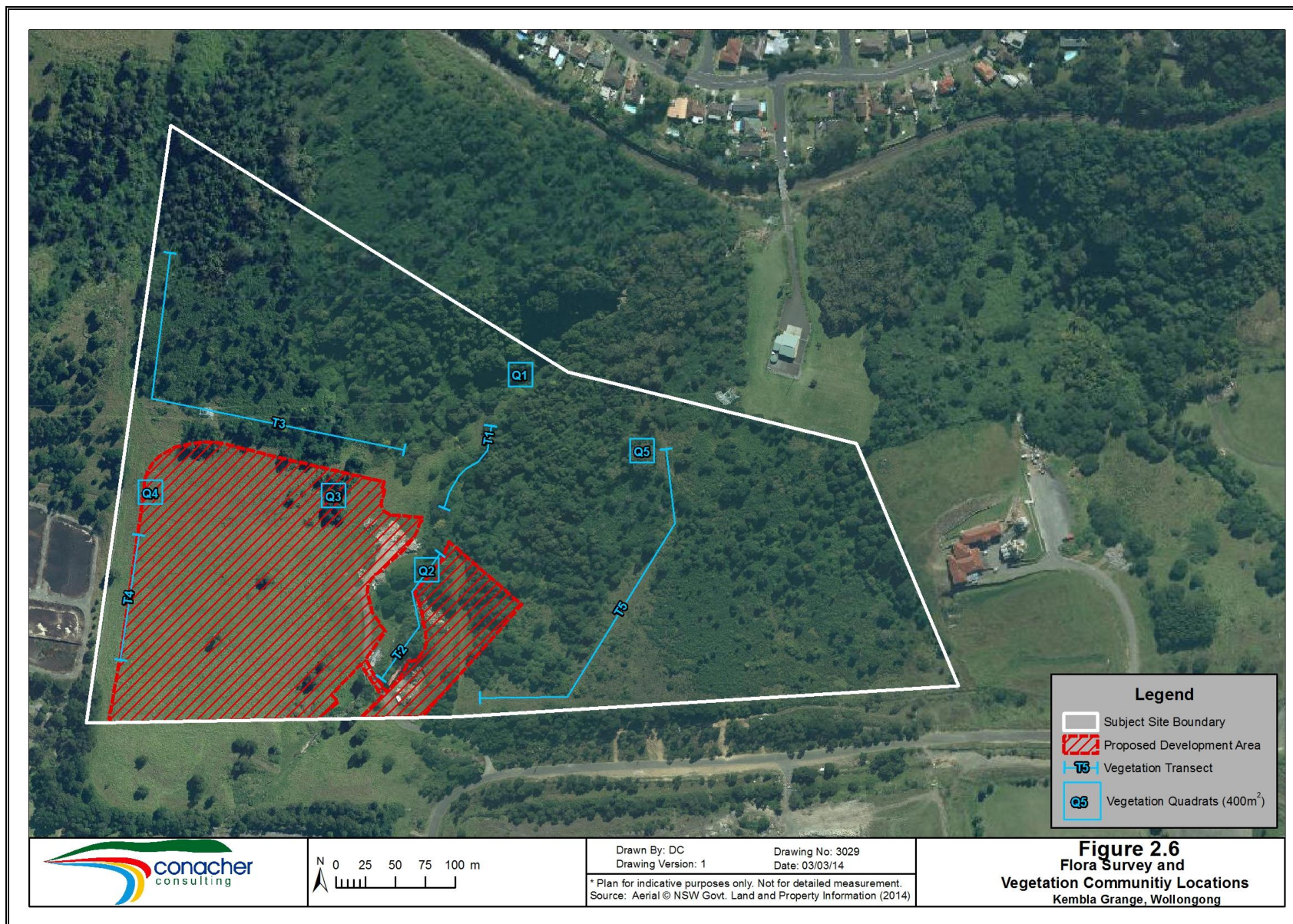
### **Flora Field Survey Effort**

Flora surveys were undertaken to meet the stratification and effort requirements outlined in DEC (2004). Initial walkover surveys identified the presence of three distinct vegetation communities over which flora surveys were stratified. A comparison of the minimum level of effort recommended by DECC (2004) and the effort expended during current flora surveys is documented in Table 2.2.

It is considered that further surveys during the flowering period for locally occurring cryptic flora species is not required as the site does not provide suitable habitat for locally occurring cryptic threatened species, such as orchids, which are only identifiable at certain times of the year.

<b>TABLE 2.2 FLORA SURVEY DETAILS</b>					
<b>Stratification Unit</b>	<b>Stratification Unit Area</b>	<b>Stratification Unit Size Class</b>	<b>Survey Guideline (DECC 2004)</b>	<b>Survey Undertaken</b>	<b>Comment</b>
Disturbed Subtropical Rainforest	1.5	<2 ha	-1 x 100m traverse  -1 x 400m <sup>2</sup> quadrat  -30 minutes random meander	-1 x 400m <sup>2</sup> quadrat  2hrs meander search targeting threatened flora species undertaken during April 2013 and February 2014	Survey requirement achieved.
Disturbed Red Gum Forest	0.5	<2 ha	-1 x 100m traverse  -1 x 400m <sup>2</sup> quadrat  -30 minutes random meander	-1 x 400m <sup>2</sup> quadrat  1hr meander search targeting threatened flora species undertaken during April 2013 and February 2014	Survey requirement achieved.
Regrowth Acacia and Exotic Shrubs	12.5	2-50ha	2 x 100m traverses  -2 x 400m <sup>2</sup> quadrats  -1 hr random meander searches	2 x 100m traverses  -2 x 400m <sup>2</sup> quadrats  -2hrs meander search targeting threatened flora species undertaken during April 2013 and February 2014	Survey requirement achieved.
Cleared Land	7.3	2-50ha	Totally cleared land – Threatened species searches	1 x 100m traverse  -1 x 400m <sup>2</sup> quadrat  -1hr meander search targeting threatened flora species undertaken during April 2013 and February 2014	Survey requirement achieved.





## 2.2.2 Fauna Field Surveys

### ***Fauna Field Survey Techniques Employed***

A detailed fauna survey was undertaken generally incorporating the methodologies outlined in DEC (2004). Due to the large amount of disturbance within the site and surrounding locality and the restricted area of proposed development, surveys were targeted to habitats within and surrounding the proposed development footprint. Due to the large amount of disturbance present and the restricted occurrence of intact native vegetation across the site, the site was surveyed as one stratification unit for fauna species.

The survey methods that were utilised for each target fauna taxa are presented in Table 2.3. The locations of fauna field surveys are shown in Figure 2.7.

<b>TABLE 2.3 FAUNA SURVEY TECHNIQUES UTILISED</b>										
<b>Survey Techniques Utilised</b>	<b>Amphibians</b>	<b>Reptiles</b>	<b>Diurnal Birds</b>	<b>Nocturnal Birds</b>	<b>Arboreal Mammals</b>	<b>Medium Terrestrial Mammals</b>	<b>Small Terrestrial Mammals</b>	<b>Megachiropteran Bats</b>	<b>Microchiropteran Bats</b>	<b>Fishes</b>
Diurnal Habitat Search / Area Search	x	x	x	x	x	x	-	x	x	x
Night Habitat Search / Spotlighting	x	x	-	x	x	x	x	x	x	x
Nocturnal Call Playback	x	-	-	x	x	-	-	-	-	-
Night Watercourse Search	x	-	-	-	-	-	-	-	-	x
Stag watching	-	-	-	x	x	-	-	-	-	-
Arboreal Elliot Trapping	-	-	-	-	x	-	-	-	-	-
Terrestrial Elliot Trapping	-	-	-	-	-	x	x	-	-	-
Wire Cage Trapping	-	-	-	-	-	x	-	-	-	-
Searches for Scats and Signs	-	-	-	x	x	x	x	x	-	-
Ultrasonic Call Recording	-	-	-	-	-	-	-	-	x	-
Opportunistic Observation and/or Call Recognition	x	x	x	x	x	x	x	x	x	x

In addition to the methods outlined in Table 2.3, a habitat assessment and hollow bearing tree surveys was undertaken within the site.

The hollow bearing tree survey involved systematic searches throughout the proposed development area on foot to assess and detect the presence of tree hollows. Inspection of trees was undertaken by encircling trees from ground level from vantage points which allowed inspection from each cardinal point. Binoculars were utilised to assist with the detection of tree hollows. Observation of fauna use was also recorded and included searches for scratches on the trunk of trees and evidence of nesting material, signs of chewing, rubbing, scratching or droppings on hollow entrances, presence of fauna inside hollows and fauna entering or exiting hollows.

Each hollow bearing tree observed was numbered and tagged and its location was recorded on an aerial photograph of the site.

The following Information was recorded for each hollow bearing observed:

- Tree tag number;
- Tree species name;
- DBH (diameter of trunk at 1.4 metres above ground);
- Canopy spread;
- Tree health as a percentage of healthy growth compared to dead limbs;
- Hollow aperture diameter;
- Position of the hollow in the tree (broken trunk, trunk, basal and branch);
- Presence and size of any split wood, cracked bark or hollow arboreal termite nests; and
- Species of any fauna observed utilising the hollows observed.

## Fauna Field Survey Effort

The dates and times of fauna surveys undertaken are shown in Table 2.4.

TABLE 2.4 FAUNA SURVEY DATES AND TIMES		
Survey Type	Date	Time
Diurnal Surveys	22 April 2013	3hrs 1300-1600 (2 persons)
	23 April 2013	7hr 0730 - 1400
	24 April 2013	1hrs 0700-0800 3hrs 1430-1730
	25 April 2013	3hrs 1000-1300
	30 April 2013	7hrs 1000 – 1700 (2 persons)
	26 February 2014	0.5 hrs 1745-1815
	27 February 2014	2.25 hrs 0700-0915 0.5 hrs 1930-2000
Nocturnal Surveys	22 April 2013	2hrs 2000 – 2200 (2 persons)
	24 April 2013	3hrs 1730 - 2030
	26 February 2014	2hrs 2000-2200
	27 February 2014	2hrs 2000-2200
Trapping Surveys	22 April 2013	Overnight
	23 April 2013	Overnight
	24 April 2013	Overnight

The effort expended during the undertaking of each fauna survey technique and a comparison of the level of effort recommended within the DEC (2004) survey guidelines is provided in Table 2.5.

TABLE 2.5 FAUNA SURVEY EFFORT DETAILS				
Threatened Fauna Species	Survey Methodology	Suggested Minimum Survey Guideline (DECC 2004)	Survey Undertaken	Comments
AMPHIBIANS	Diurnal Habitat Search	1hr per stratification unit.  (Note: Seasonal peak activity period = November to May).	Diurnal habitat search  7hrs / 24 April 2013 & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed effort requirements
	Night Habitat Search	30min x 2 nights / stratification unit.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements February surveys undertaken during periods of wet / warm weather.
	Nocturnal Call Playback	2 nights.	4 nights / 22 & 24 April 2013 26 & 27 February 2014	4 nights / 22 & 24 April 2013 26 & 27 February 2014
	Night watercourse Search	2hrs per 200m of water body edge.	4 person hrs over 4 nights/ 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken meet exceeds requirements
REPTILES	Diurnal Habitat Search	30min x 2 days / per 100ha stratification unit.	22.25hrs targeted and opportunistic observation over 7 days / 22-25 April & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed effort requirements

**TABLE 2.5  
FAUNA SURVEY EFFORT DETAILS**

<b>Threatened Fauna Species</b>	<b>Survey Methodology</b>	<b>Suggested Minimum Survey Guideline (DECC 2004)</b>	<b>Survey Undertaken</b>	<b>Comments</b>
	<b>Spotlighting</b>	30min x 2 nights / per 100ha stratification unit.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
<b>DIURNAL BIRDS</b>	<b>Area Search</b>	Methodology not resolved – (search utilising species time curve may be used).  Undertake seasonal searches.	22.25hrs targeted and opportunistic observation over 7 days / 22-25 April & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
<b>NOCTURNAL BIRDS</b>	<b>Call playback</b>	Sites separated by 800m to 1km. -5 visits for Powerful Owl, Barking Owl and Grass Owl -6 visits for Sooty Owl -8 visits for Masked Owl	4 nights / 22 & 24 April 2013 26 & 27 February 2014	Level of surveys undertaken are considered suitable due to the lack of roosting / nest habitat present within development area.
	<b>Day habitat search</b>	Search for pellets and likely hollows.	22.25hrs targeted and opportunistic observation over 7 days / 22-25 April & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Stag watching</b>	Observing potential roost hollows for 30mins prior to sunset and 60mins following sunset.	Undertaken during spotlighting surveys	Surveys undertaken exceed requirements
	<b>Spotlighting</b>	By foot or from vehicle.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
<b>MEDIUM TERRESTRIAL MAMMALS</b>	<b>Medium terrestrial mammal Elliot trapping</b>	100 trap nights over 3-4 consecutive nights	102 trap Elliot trap nights (small and medium terrestrial mammal combined)	Surveys undertaken exceed requirements
	<b>Wire Cage Trapping</b>	24 trap nights over 3-4 consecutive nights	24 cage trap nights	Surveys undertaken meet requirements
	<b>Spotlighting</b>	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Search for scats and signs</b>	- 30 minutes searching each relevant habitat, including trees for scratch marks / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Searches of trees where present and accessible.	Surveys undertaken meet requirements
	<b>Collection of predator scats</b>	Opportunistic.	Opportunistic	Surveys undertaken meet requirements



**TABLE 2.5**  
**FAUNA SURVEY EFFORT DETAILS**

<b>Threatened Fauna Species</b>	<b>Survey Methodology</b>	<b>Suggested Minimum Survey Guideline (DECC 2004)</b>	<b>Survey Undertaken</b>	<b>Comments</b>
<b>SMALL TERRESTRIAL MAMMALS</b>	<b>Small terrestrial mammal Elliot trapping</b>	Combined Elliot trapping must equate to 100 trap nights over 3-4 consecutive nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	102 trap Elliot trap nights (small and medium terrestrial mammal combined)	Surveys undertaken exceed requirements
	<b>Spotlighting</b>	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Collection of predator scats</b>	Opportunistic.	Opportunistic	Surveys undertaken meet requirements
<b>ARBOREAL MAMMALS</b>	<b>Arboreal Mammal Elliot trapping</b>	24 trap nights over 3-4 consecutive nights.	30 arboreal trap nights	Surveys undertaken exceed requirements
	<b>Spotlighting</b>	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Call Playback</b>	2 sites per stratification unit (up to 200ha).	4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Stag-watching</b>	1 survey	Undertaken during spotlighting surveys	Surveys undertaken exceed requirements
	<b>Search for scats and signs</b>	30 minutes searching each relevant habitat, including trees for scratch marks / per 50ha stratification unit, plus additional effort for every additional 100 hectares.	Searches of trees where present and accessible.	Surveys undertaken meet requirements
	<b>Collection of predator scats</b>	Opportunistic.	Opportunistic	Surveys undertaken meet requirements
<b>MEGA BATS</b>	<b>Spotlighting</b>	1hr x 2 nights / per 100ha stratification unit.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Diurnal Habitat Search</b>	Search for bat excreta at or near potential habitats.	22.25hrs targeted and opportunistic observation over 7 days / 22-25 April & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
<b>MICRO BATS</b>	<b>Ultrasonic Call Recording</b>	2 devices overnight (min 4 hrs) x 2 nights / per 100ha stratification unit (October to March).	2 devices overnight x 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken meet effort requirements. Seasonal requirement not met, however proposal not likely to require removal of roost habitats



**TABLE 2.5**  
**FAUNA SURVEY EFFORT DETAILS**

<b>Threatened Fauna Species</b>	<b>Survey Methodology</b>	<b>Suggested Minimum Survey Guideline (DECC 2004)</b>	<b>Survey Undertaken</b>	<b>Comments</b>
	<b>Spotlighting</b>	1hr x 2 nights / per 100ha stratification unit.	9 person hrs over 4 nights / 22 & 24 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements
	<b>Diurnal Searches</b>	Search for bat excreta at or near potential habitats.	22.25hrs targeted and opportunistic observation over 7 days / 22-25 April & 30 April 2013 26 & 27 February 2014	Surveys undertaken exceed requirements