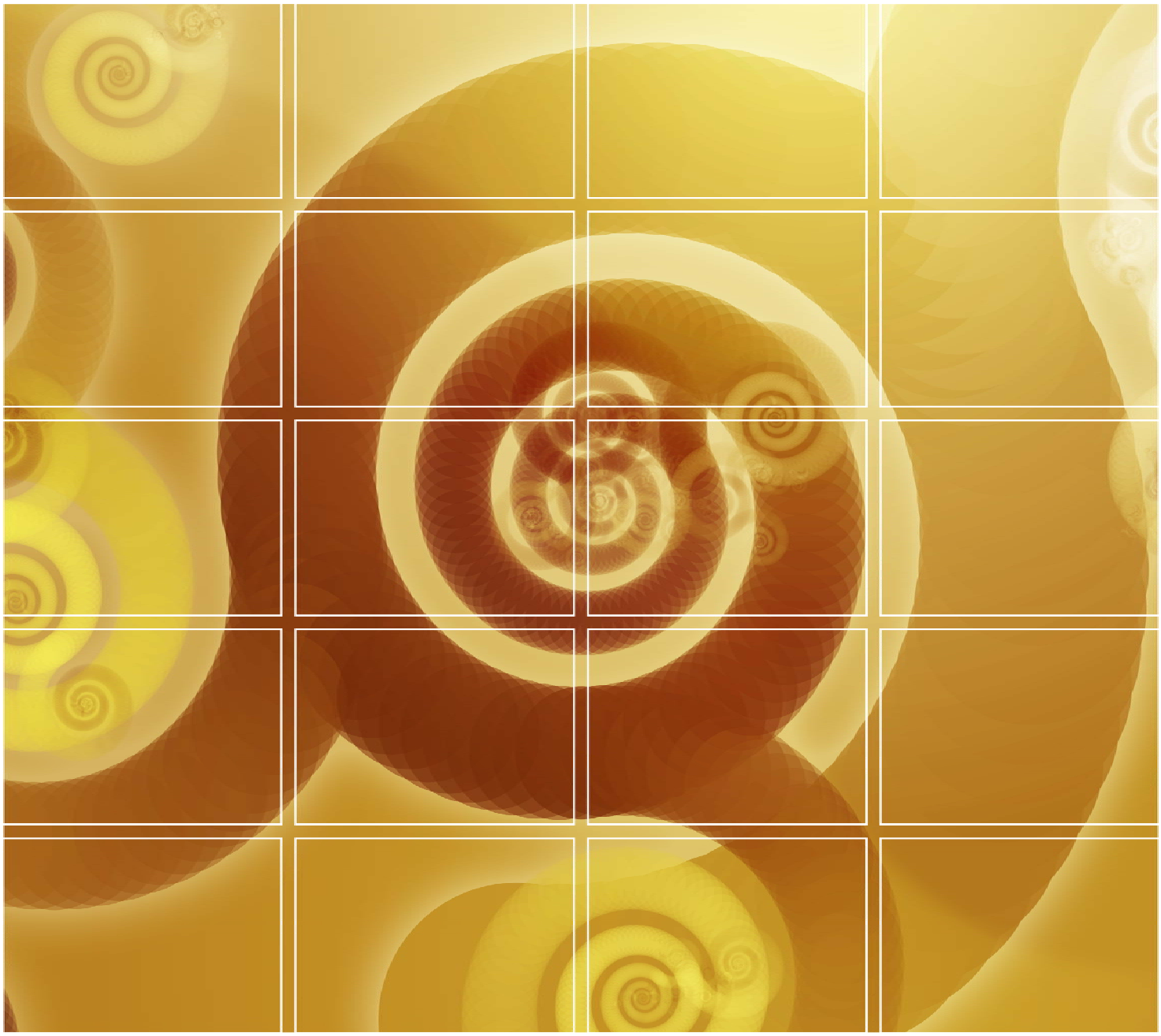

Port Macquarie Base Hospital Redevelopment MP 11_0012

Ecological Assessment

Hassell

January 2012

0124276 P3A FINAL

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FINAL REPORT

Hassell

Port Macquarie Base Hospital Redevelopment MP 11_0012

Ecological Assessment

January 2012

Reference: 0124276_P3A_FINAL

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Port Macquarie Base Hospital Redevelopment MP 11_0012

Ecological Assessment

Hassell

January 2012

Approved by:	*Andrew Morris*
Position:	Project Manager
Signed:	
Date:	*16 January, 2012*
Approved by:	*Murray Curtis*
Position:	Principal
Signed:	
Date:	*16 January, 2012*

Environmental Resources Management Australia Pty Ltd Quality System

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EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) were engaged by Hassell to prepare an ecological assessment of the proposed redevelopment of the Port Macquarie Base Hospital (PMBH).

This report presents the methods and results of the ecological investigation undertaken by ERM and assesses the potential ecological impacts resulting from the proposed redevelopment. It is to be read in conjunction with an Environmental Assessment (EA) report that has been prepared for the proposal under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (Architectus in prep.).

ERM have undertaken flora and fauna assessments on the hospital grounds and immediate environs over three main survey periods being December 2010, September 2011 and November 2011. The development footprint has been cleared previously and is characterised by maintained grassland, planted native and exotic vegetation in the PMBH Rainforest Amenity Area, and remnant Blackbutt Tall Open Forest to the west of the hospital within the Oxley Highway road reserve. Survey techniques were tailored for the modified environment and target species as informed by database and literature review. Surveys included vegetation surveys, fauna habitat assessments, spotlighting, ultrasonic bat call detection and Koala activity assessments. ERM consulted with the local Port Macquarie Koala Hospital to obtain data on recent Koala records within the vicinity of the PMBH.

The proposed redevelopment of PMBH and associated bushfire asset protection zone would require the removal of approximately 83 eucalypt trees of which 62 were planted and 21 are remnant trees, and approximately 0.1ha of planted rainforest species. No visible hollows were observed within the trees although it is likely that small hollows (5-10cm diameter) may be present in the upper branches of some of the larger eucalypts in the south eastern corner of the PMBH site.

Eucalypt trees to be removed included recognised Koala feed tree species (Tallowwood, Forest Red Gum, Swamp Mahogany and Blackbutt) known to provide a suitable foraging resource for a viable local Koala population.

No threatened flora species were observed within the proposed development footprint and vegetation is not considered to be part of an Endangered Ecological Community under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A total of eight threatened fauna species were recorded during field investigations including the Masked Owl, Koala (*Phascolarctos cinereus*), Grey-headed Flying-fox, Eastern Freetail-bat (*Mormopterus norfolkensis*), Hoary Wattled Bat (*Chalinolobus nigrogriseus*), Greater Broad-nosed Bat (*Scotaneax rueppellii*), Little Bentwing-bat (*Miniopterus australis*) and Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*). These species are all listed as Vulnerable under the TSC Act and the Grey-headed Flying-fox is also listed as Vulnerable under the EPBC Act.

The potential for the proposed redevelopment to impact upon threatened species has been assessed in accordance with the requirements of the TSC Act and Commonwealth EPBC Act (refer *Section 6.1* and *Section 6.2*). An assessment was undertaken for the Grey-headed Flying-fox in accordance with *EPBC Act Policy Statement 1.1: Significant Impact Guidelines* (DEH 2006) (refer *Annex C*). Assessment showed that although the proposal would result in the removal of foraging habitat, it was not expected to have a significant impact on an 'important population' of this highly mobile species given the prevalence of similar vegetation within the locality, including the presence of higher quality foraging habitat surrounding Lake Innes Nature Reserve.

An assessment of the impact of the proposal on migratory species as listed under the EPBC Act was undertaken. Given the nature of the proposal and the fact that migratory species identified within the site are considered to be wide-ranging with generalist habitat requirements, it was determined that the proposal is unlikely to have a significant impact on the Masked Lapwing as it was not considered to:

- substantially modify, destroy or isolate an area of important habitat for these species;
- result in harmful invasive species becoming established within the site; or
- seriously disrupt the life cycle of an ecologically significant proportion of a population of the species.

Consequently, further assessment under the EPBC Act is not required and a referral to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) is not warranted.

Assessment of the potential for the proposed action to impact upon threatened species and EECs listed above was undertaken in accordance with the seven factors outlined in Section 5A of the EP&A Act (known as the '7-part test' or 'Assessment of Significance') (refer *Annex D*). The assessment showed that the proposal would impact upon the local foraging behaviour and resources of the species listed in *Table 6.2*, in particular the Koala. With the adoption of mitigation measures outlined in *Chapter 7*, the proposal is considered unlikely to have a significant impact on threatened species such that a viable local population would be placed at risk of extinction in the long-term.

The following measures are recommended to further reduce the potential for impact as a result of the proposed action:

- minimise vegetation clearance through delineation of designated construction areas and access tracks to protect native vegetation located adjacent to areas of impact;

- prior to and during removal of Koala feed trees implement measures to avoid impacting on individuals including pre-clearance inspection of trees for Koalas;

- ensure an ecologist is present during vegetation removal to relocate any identified fauna to a safe location, conduct post-clearing inspection of potential tree hollows and rescue any injured fauna;

- implement erosion and sediment control measures in accordance with an Environmental Management Plan (EMP) to prevent sedimentation of surrounding vegetation; and

- control weeds in accordance with an EMP during and following construction to avoid the spread of weeds.

Compensatory planting of Koala feed trees at a minimum ratio of 2:1 and in a suitable location is recommended to minimise impacts associated with loss of Koala foraging habitat. Due to limited space availability within the PMBH site, an appropriate off-site location would need to be identified to accommodate compensatory planting that cannot be located within the confines of the PMBH. Details regarding the location, species and quantities of plantings may be developed in consultation with the Koala Preservation Society and other relevant authorities.

With the adoption of these mitigation measures, the proposed action is considered unlikely to have a significant impact on threatened species as listed under Commonwealth or State legislation such that a viable population is at risk of extinction.

1 INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Hassell to prepare an ecological assessment of the proposed redevelopment of the Port Macquarie Base Hospital (PMBH).

This report presents the methods and results of the ecological investigation undertaken by ERM and assesses the potential ecological impacts resulting from the proposed redevelopment. It is to be read in conjunction with an Environmental Assessment (EA) report that has been prepared by Architectus for the proposal under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Within the report, the term 'site' is used to describe the area occupied by the PMBH building and associated infrastructure and the term 'locality' is used to describe the area within a 10 kilometre (km) radius of the site.

1.1 LOCATION

PMBH is located on Lot 23 DP 852214 Wrights Road, which is accessed via the Oxley Highway, approximately three kilometres to the south west of the Port Macquarie Central Business District (CBD) on the Mid North Coast of NSW (see *Figure 1.1*).

The site occurs within the Port Macquarie-Hastings Council (PMHC) Local Government Area (LGA) and is zoned Special Purpose Infrastructure (SP2) – Health Services Facility under the Port Macquarie-Hastings Local Environmental Plan 2011 (Port Macquarie-Hastings LEP).

1.2 PROJECT DESCRIPTION

The proposed redevelopment involves the construction of a building at the western end of the existing PMBH (see *Figure 1.2*) comprising:

- a 30 bed acute medical services unit;
- a 24 bed critical care unit;
- seven new collocated theatres comprising five operating theatres and two procedure rooms;
- a cardiac catheter suite (incorporated into one of the theatres);
- a peri-operative unit including 32 patient bays;
- expansion of the emergency department to accommodate 26 spaces (previously 14);

- a clinical services sterilisation department; and
- storage space including an area which can accommodate an additional eighth theatre in the future.

The redevelopment also involves the restructuring and refurbishment of existing facilities at the PMBH site to provide for:

- the emergency medical unit and emergency community care centre;
- expansion of existing private sector diagnostic services;
- expansion of the existing surgical unit; and
- relocation of pre-admissions clinic and day treatment areas.

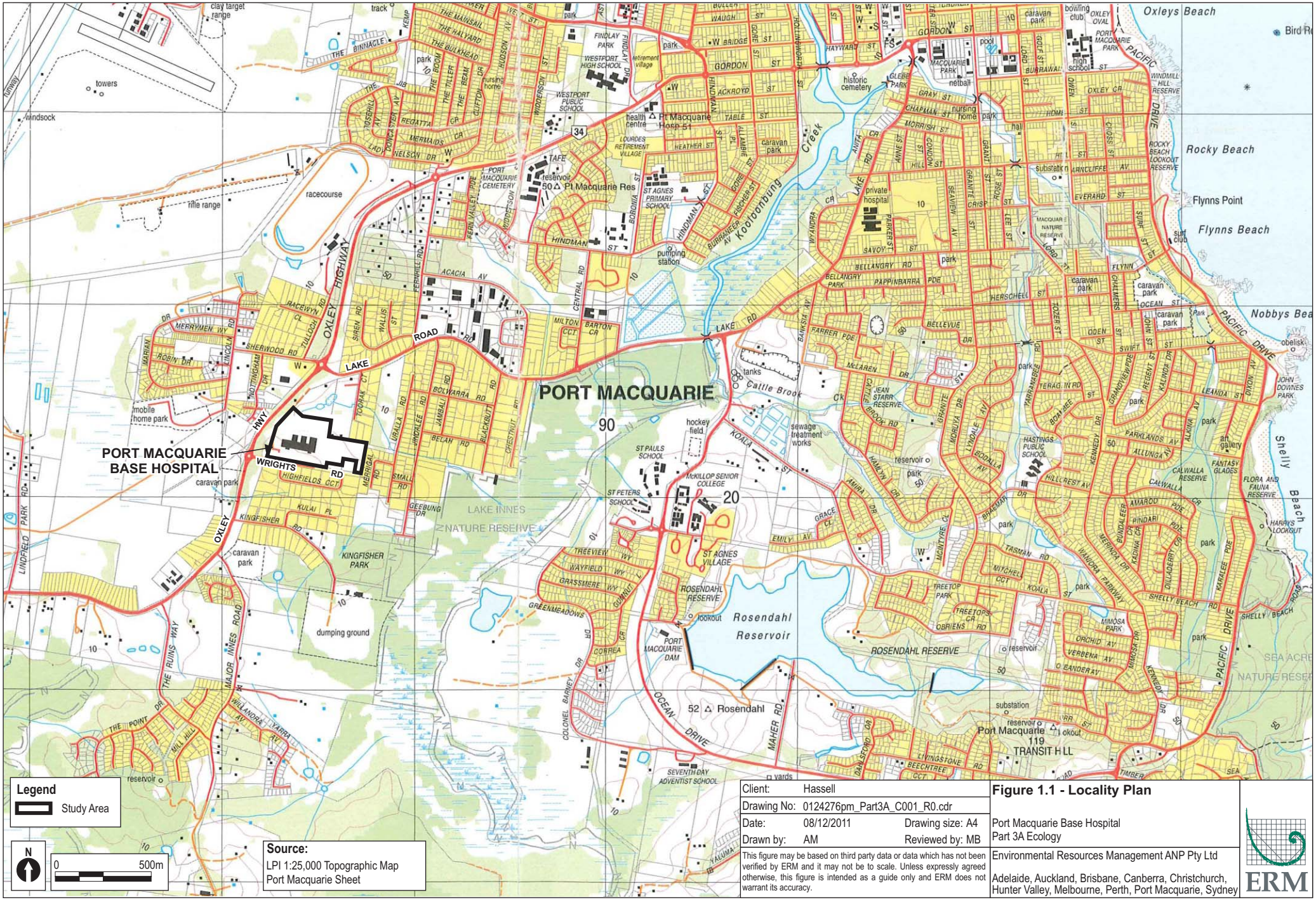
Further details of the proposed redevelopment are provided in the EA report (Architectus in prep).

1.3 AIMS AND OBJECTIVES

The aim of this study was to assess the ecology of the site and identify potential environmental impacts resulting from the proposal in accordance with relevant local, state and Commonwealth legislation.

Specifically this report aims to:

- identify flora and fauna species, habitats and communities within the site and describe them in a broader environmental context;
- assess the potential of the site to significantly contribute to the conservation value of the surrounding area;
- assess the potential for threatened species, populations or endangered ecological communities as listed under relevant legislation to occur within the site;
- identify and assess the potential impacts resulting from the proposed works on species, populations, ecological communities or their habitats; and
- provide mitigation measures to reduce any potential impacts identified.



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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 1.1 - Locality Plan

Port Macquarie Base Hospital
Part 3A Ecology

Environmental Resources Management ANP Pty Ltd

Adelaide, Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

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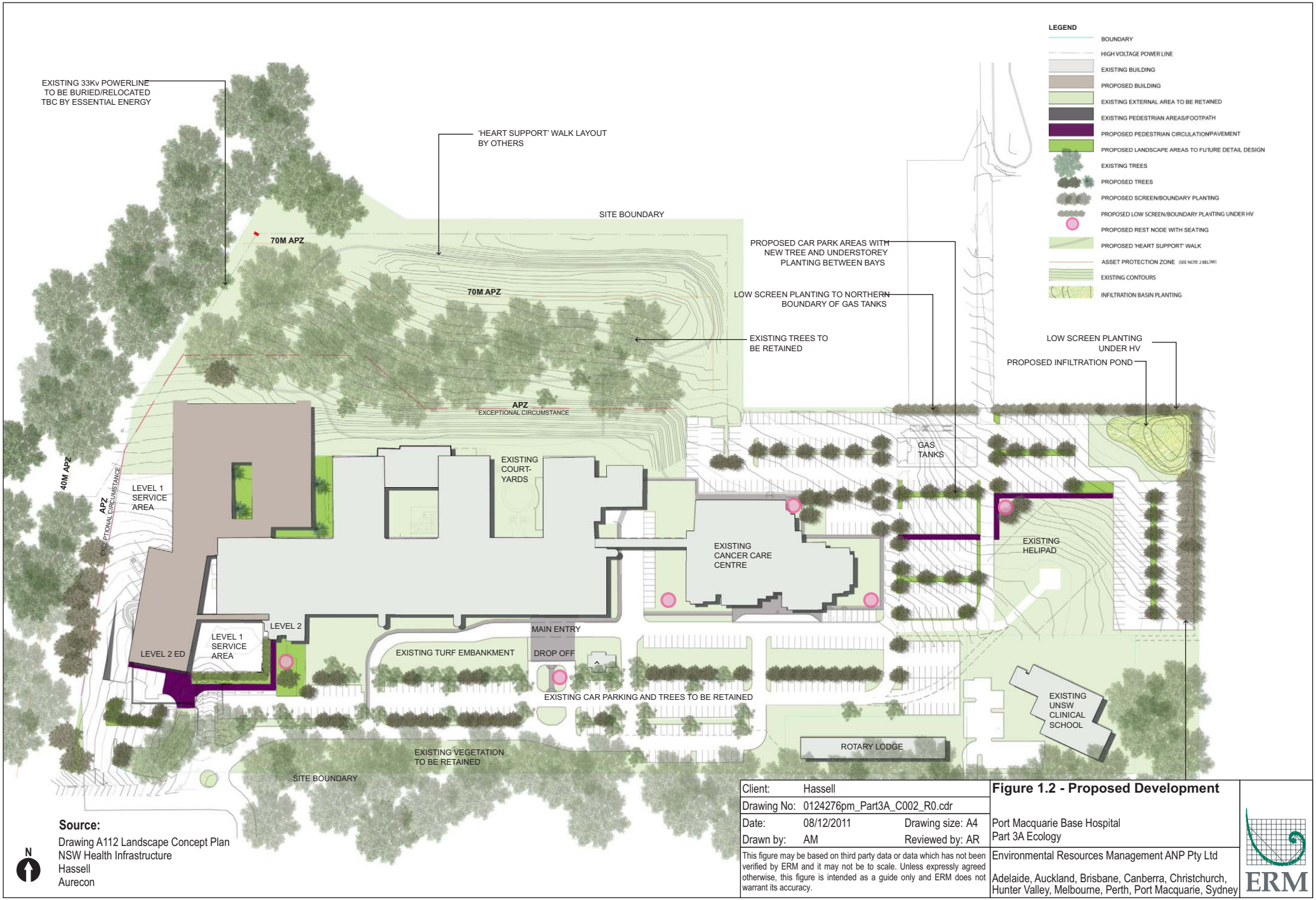

Source:

Drawing A112 Landscape Concept Plan
NSW Health Infrastructure
Hassell
Aurecon

Client:	Hassell		
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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 1.2 - Proposed Development

Port Macquarie Base Hospital
Part 3A Ecology

Environmental Resources Management ANP Pty Ltd

Adelaide, Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

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2 EXISTING ENVIRONMENT

2.1 LAND USE

PMBH operates on the site which comprises an area of 9.247 hectares (ha). The hospital was constructed in 1994, originally operating as a private hospital until 2005 when it was reinstated to the public sector (NSW Health Infrastructure 2010).

PMBH operates as the clinical care hub within the Hastings Macleay Health Network providing emergency operating theatres for all day surgery, intensive care, coronary care and a range of diagnostic services that are available 24 hours a day (NSW Health Infrastructure 2010).

The existing hospital consists of a large rectangular building and three adjoining rectangular "pods" each occupying an area of 820 square metres (m^2) and comprising two levels (NSW Health Infrastructure 2010) (see *Figure 1.2*).

In addition to the main building, the site also comprises:

- the North Coast Cancer Institute facility;
- a helipad;
- car parking; and
- maintenance facilities.

Two subdivisions occupy the south eastern corner of the site. Rotary Lodge which provides accommodation for family of hospital patients occupies subdivision Lot 21 DP 852214, and the University of NSW (UNSW) School of Rural Health occupies subdivision Lot 22 DP 852214 (NSW Health Infrastructure 2010).

The site is bordered by the Oxley Highway to the west, residential areas to the north and south and light industrial areas to the east.

2.2 CLIMATE

Port Macquarie experiences a temperate climate with temperatures rarely going above 30 degrees Celsius (^oC) or below 15^oC (PMHC 2008). Average maximum temperatures range from 17.9^oC in winter to 25.9^oC in summer while average minimum temperatures range from 7.2^oC in winter to 18.4^oC in summer (BOM 2011).

Annual mean rainfall for Port Macquarie is 1535 millimetres (mm) (BOM 2011). Rainfall is generally greatest during the summer and autumn months with the wettest month, February receiving an average of 178.1mm and the driest month, August receiving an average of 81.3mm (BOM 2011).

2.3 *TOPOGRAPHY AND HYDROLOGY*

The site lies between 10 to 20 metres (m) Australian Height Datum (AHD) and slopes to the north east towards a drainage line that flows into the Lake Innes Nature Reserve located approximately 0.5km to the east.

2.4 *SOILS AND GEOLOGY*

According to Atkinson (1999), the site is comprised of the Thrumster residual soil landscape which is characterised by deep, well-drained soils that have a low wet bearing strength, high permeability, strong acidity, low subsoil fertility and moderately reactive subsoils. This soil landscape is generally underlain by metamorphic complexes of the Port Macquarie Block (Atkinson 1999).

3 RELEVANT LEGISLATION

Relevant legislation and environmental planning instruments related to the potential ecological impacts of the proposal are discussed in the following sections. A full consideration of legislation and planning instruments relevant to the activity is provided in the main EA report (Architectus in prep.).

3.1 COMMONWEALTH LEGISLATION

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act*)* streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and cultural places. Under the EPBC Act, an assessment and approvals process has been developed for actions that significantly impact Matters of National Environmental Significance (MNES) as listed under the Act.

Implications for the Proposal

MNES in relation to the site and the proposal are addressed in *Table 3.1*. An assessment of the potential impacts of the proposal on listed threatened or migratory species is provided in *Chapter 6* and *Annex C* of this report.

Table 3.1 Relationship between the Proposal and Matters of National Environmental Significance

Matters of National Environmental Significance	Application to the Project	Relevant Sections
World Heritage Properties	Not identified within the site.	Not applicable
National Heritage Places	Not identified within the site.	Not applicable
Wetlands of International Significance (Ramsar)	Not identified within the site.	Not applicable
Great Barrier Reef Marine Park	Not identified within the site.	Not applicable
Commonwealth Marine Areas	Not identified within the site.	Not applicable
Threatened Ecological Communities	Not identified within the site.	Not applicable
Threatened Species	Threatened species identified as potentially occurring within the site.	*Chapter 6* and *Annex C*
Migratory Species	Migratory species identified as potentially occurring within the site.	*Chapter 6* and *Annex C*

3.2 STATE LEGISLATION

3.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) institutes a system of environmental planning and assessment in NSW and is administered by the Department of Planning and Infrastructure (DoPI)

Implications for the Proposal

At the time that the Director-General Requirement's (DGRs) were issued (23rd February 2011), the proposed PMBH redevelopment was declared a "Major Project" under Schedule 1 of State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP), with the Minster for Planning and Infrastructure as the Consent Authority for the Project Application.. Part 3A of the EP&A Act details the approval process for major infrastructure and other significant 'projects'.

Although Part 3A of the EP&A Act was repealed in 1 October 2011, assessment under this legislation continues to apply given that the DGRs were issued before this time and consequently the Major Project declaration remains in force. Undetermined applications such as this one will continue to be assessed and determined under Part 3A of the EP&A Act, as amended by the Major Development SEPP.

Under Section 75R of the EP&A Act, environmental planning instruments other than State Environmental Planning Policies do not apply to a 'Major Project'. However, in accordance with Section 75J, the Minister, when deciding whether or not to approve the carrying out of a project, may take into account the provisions of any environmental planning instrument (EPI). In this regard, the Minister is not bound by environmental planning instruments other than SEPPs but is obliged to consider such instruments.

Section 5A of the EP&A Act lists seven factors that must be taken into account in the determination of the significance of potential impacts of a proposed development on 'threatened species, populations or ecological communities (or their habitats) listed under the TSC Act. The ' seven part test' is used to determine whether a proposed development is 'likely' to impose 'a significant effect' on threatened biota.

There is no requirement for the consent authority to consider s.5A of the EP&A Act when determining a Project Application under Part 3A of the Act. However seven part tests pursuant to s.5A of the EP&A will be used to determine if the proposed development will have a significant impact on threatened species, populations and communities.

3.2.2 *Threatened Species Conservation Act 1995*

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the identification, conservation and recovery of threatened species, populations and ecological communities in New South Wales. Developments requiring approval from a statutory authority of the NSW State Government are required to be assessed in accordance with Section 5A of the EP&A Act, as amended by the TSC Act.

Implications for the Proposal

As stated in *Section 3.2.1*, an assessment of the potential impacts of the proposal on listed threatened species, populations and ecological communities is provided in *Chapter 6* and *Annex D* in accordance with Section 5A of the EP&A Act.

3.2.3 *Native Vegetation Act 2003*

The Native Vegetation Act 2003 (NV Act) provides mechanisms for the management of native vegetation in non-urban areas of regional NSW. The NV Act aims to provide flexibility and incentives for farmers to manage native vegetation, end broad scale clearing (unless it improves or maintains environmental outcomes) and encourage healthy and productive landscapes.

Implications for the Proposal

Under Section 75U(1) of the EP&A Act, approval under the NV Act is not required for projects being assessed under Part 3A. Consequently, the provisions of the NV Act do not apply.

3.2.4 *Noxious Weeds Act 1993*

The *Noxious Weeds Act 1993* (NW Act) aims to reduce the negative impacts of weeds on the economy, community and environment by preventing the establishment and restricting the spread and area of noxious weeds as declared by the Minister for Environment.

Implications for the Proposal

Under the NW Act, occupiers of land are required to take measures to control noxious weeds. Identification of noxious weeds was undertaken as part of the ecological assessment. Results and weed management measures are provided in *Chapter 5* and *Chapter 7*.

3.2.5 *State Environmental Planning Policy No. 44 – Koala Habitat Protection*

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the conservation and management of areas of natural vegetation which provide habitat to the Koala (*Phascolarctos cinereus*).

SEPP 44 provides a mechanism for assessing whether an area is 'core' or 'potential' Koala habitat. Under SEPP 44 *potential* koala habitat is defined as vegetation that incorporates a minimum of 15 percent of tree species in the '*upper or lower strata of the tree component*' listed in Schedule 2 of SEPP 44. *Core* koala habitat is defined as '*an area of land with a resident population of Koalas, evidenced by attributes such as breeding females…and recent sightings of and historical records of a Koala population*'.

Implications for the Proposal

The provisions of SEPP 44 apply to this proposal in so far as an assessment of Koala habitat using the definitions of SEPP 44 has been provided in *Section 5.2.4*. Potential impacts to the Koala has been assessed in accordance with Section 5A of the EP&A Act as amended by the TSC Act (refer *Chapter 6* and *Annex D*).

3.3 *LOCAL LEGISLATION*

3.3.1 *Port Macquarie-Hastings Local Environmental Plan 2011*

The Port Macquarie-Hastings LEP establishes a policy framework for land use decisions within the Port Macquarie-Hastings LGA.

Implications for the Proposal

The site is zoned Special Purpose Infrastructure (SP2) – Health Services Facility under the Port Macquarie-Hastings LEP. The proposed works are permitted with development consent within this zone.

An area of vegetation in the south eastern corner of the site is mapped as "Koala Habitat" under the Port Macquarie-Hastings LEP. Under Clause 7.5 of the LEP:

> *'development consent must not be granted for development on land to which this applies unless the consent authority is satisfied that the development is consistent with the relevant provisions of an adopted plan of management prepared pursuant to SEPP 44.'*

Development on land mapped as "Koala Habitat" requires the preparation and adoption of an approved Koala Plan of Management (KPoM) prepared in accordance with the provisions of SEPP 44. Although the proposed works would not occur on land mapped as "Koala Habitat" consideration of the potential impacts on the Koala has been assessed in accordance with Section 5A of the EP&A Act as amended by the TSC Act (refer *Chapter 6* and *Annex D*).

It should be noted that the Koala Habitat as mapped by the LEP appears to have been largely cleared. There is a small stand of remnant vegetation in the south east corner of the PMBH grounds that supports Koala feed trees and this area was considered in this assessment.

3.3.2 Port Macquarie-Hastings Development Control Plan 2011

The Port Macquarie-Hastings Development Control Plan 2011 (Port Macquarie-Hastings DCP) supports the provisions of the Port Macquarie-Hastings LEP and provides a clear and concise set of objectives and provisions for assessing development within the LGA.

Implications for the Proposal

Part 3 (Table 1) of the Port Macquarie-Hastings DCP lists trees preferred Koala feed trees within the LGA. Listed trees are divided into three categories: primary browse species; secondary/supplementary browse species; and other browse species. The presence of listed Koala feed trees within the site is discussed further in *Chapter 5*.

4 METHODOLOGY

4.1 DESKTOP REVIEW

Background literature reviews and database searches were conducted prior to field investigations to obtain recent data on flora and fauna species, populations, communities and habitats known to occur within the site and the locality.

Background information reviewed during the assessment process included:

- *Port Macquarie Base Hospital: Koala Activity Assessment* (ERM 2010);
- *Review of Environmental Factors for Port Macquarie Base Hospital Redevelopment: Enabling Works – Ecological Assessment* (ERM 2011);
- *Draft Port Macquarie Base Hospital: Arboricultural Impact Appraisal and Method Statement* (Naturally Trees 2011);
- *Draft Hastings Koala Plan of Management* (KPoM) (Connell Wagner 2000);
- topographic map, aerial photograph and Geographic Information System (GIS) interpretations;
- the NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database (2011a); and
- the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) on-line search tool for MNES (2011).

Desktop habitat assessments were conducted for threatened species previously identified as occurring within the locality (OEH 2011a) or considered to potentially occur within the locality based on known habitat requirements (DSEWPC 2011). This included an evaluation of the likelihood of threatened species to inhabit or utilise the site. This information was used in the preparation of field surveys.

4.2 CONSULTATION

Cheyne Flanagan, Supervisor at the Port Macquarie Koala Hospital, was consulted during the assessment process to obtain data on recent Koala records within the vicinity of the PMBH. This involved a meeting at the Koala Hospital on the 22nd November 2011 and a subsequent e-mail containing results of a database search for all Koala Hospital admissions from areas surrounding the PMBH since 1995.

4.3 FIELD SURVEYS

Field investigations were undertaken for the Project by ERM in December 2010, and during October and November 2011. Dates of surveys and weather conditions for 2011 are provided in *Table 4.1*.

Table 4.1 Weather Observations During the Survey Period

Date	General Weather Description	Temperature (°C)		Moon Phase	Survey Type
		Min	Max		
1st and 2nd December 2010	mild weather, light rain	-	-	-	Vegetation, koala habitat and activity assessment; spotlighting and anabat.
17th October 2011	fine with some cloud and light breeze	14.2	21.6	waxing gibbous (65% full)	vegetation, diurnal fauna
2nd December 2010	Overcast,	24.2	20.4	waning crescent (13% full)	vegetation, diurnal fauna
1st November 2011	some cloud, no rain or wind	14.5	21.6	waxing crescent (38% full)	nocturnal fauna
15th November 2011	clear, no rain or wind	18.6	25.6	waning gibbous (81% full)	nocturnal fauna
21st November 2011	overcast, light rain and breeze	21	25	Waning crescent (20% full)	vegetation, diurnal fauna

Source: BOM, 2011; Willy Weather, 2011

All flora and fauna species identified during field investigations were recorded. Details of flora and fauna survey methods are outlined as follows.

4.3.1 Flora

Areas of potential impact were examined on foot enabling flora species to be recorded as they were encountered. Details regarding topography, soil, drainage and vegetation structure were also considered to enable identification of vegetation communities. Details of any disturbances (eg weed invasion, litter etc) were also recorded to assess the condition of vegetation communities.

4.3.2 Fauna

Mapping, aerial photography and field surveys were used to identify and assess the distribution of fauna habitat types within the site. An assessment of the potential habitat for fauna species (particularly with regards to threatened species) was undertaken using the following criteria:

- the presence of nesting/sheltering/basking sites such as tree hollows, litter, fallen timber and logs, caves and rocks;
- the cover/abundance of ground, shrub and canopy layers;
- drainage and the presence of freshwater or estuarine aquatic habitats such as streams, swamps and pools, noting their permanency (i.e. permanent, semi-permanent or ephemeral);
- connectivity to adjacent areas of habitat;
- the extent and nature of previous disturbances, including the presence of fire scars and dieback;
- vegetation assemblage and structure; and
- soil type and topography.

Spotlighting

Spotlighting was undertaken within the proposed development footprint over four nights (1st and 2nd December 2010, 1st November 2011 and 15th November 2011) to identify nocturnal fauna in the area. This involved inspection of potential habitat using handheld spotlights and was conducted over a total of approximately 14 person hours.

Ultrasonic Bat Detection

An Anabat echolocation call detector was used to record bat calls over a period of two nights (1st November 2011 and 15th November 2011). The Anabat unit was carried during spotlight surveys for a total of approximately eight person hours. At the conclusion of spotlighting surveys the Anabat unit was positioned at a location within the proposed development footprint until the following morning. This location is shown on *Figure 4.1*.

An Anabat unit was carried in the field during spotlighting activities associated with the *PMBH Koala Activity Assessment* (ERM 2010) on the evening of the 2nd December 2010. The results obtained during this evening are also included in this assessment.

Koala Activity Assessments

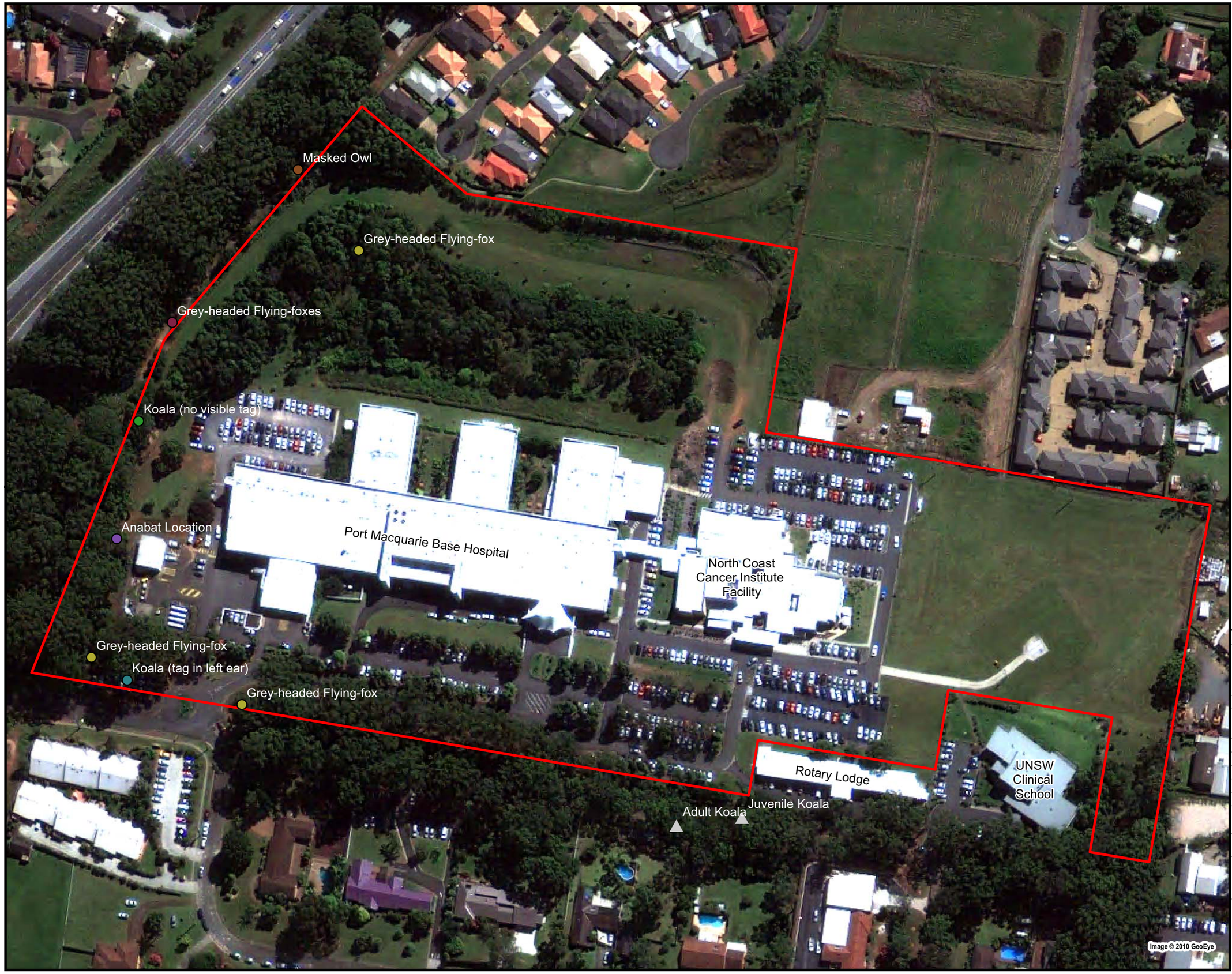
Koala habitat assessments were undertaken to identify dominant tree species noting presence of Koala feed trees as identified in Schedule 2 of SEPP 44. The habitat assessments were combined by koala activity assessments and reported in an earlier assessment for the PMBH (ERM 2010).

The Koala activity was assessed using accepted methodology as outlined in Spot Assessment Technique (SAT); determining the importance of habitat utilisation by Koalas (*Phascolartus cinereus*), Phillips and Callaghan. Three SAT sites were selected; two close to the proposed developments and one close to the area of Core Koala Habitat as mapped by council (see *Figure 4.1*). A central tree was selected which was considered important for Koala conservation or assessment purposes. The three chosen trees were selected as they were SEPP 44 Schedule 2 feed trees and had Koala pellets present at the base. Thirty (30) trees surrounding the selected core tree were then surveyed for Koalas and Koala Pellets. For each tree, height, the diameter at breast height (DBH) and the presence of Koala scratches were recorded. The percentage of trees with pellets was calculated and then the activity level for the area assigned based on typical results for the area, either as low, medium or high use (Phillips and Callaghan). Information gained from tree measurements and species was also used to assess the Koala habitat within the area. Any incidental Koala sightings and signs were also recorded

Spotlighting was conducted over two nights for a total of six person hours, aiming to observe Koalas when they are most active.

Opportunistic Sightings

Fauna species not recorded during targeted surveys were recorded opportunistically as encountered. Any evidence of fauna such as tracks, scats, scratches on and around trees and any potential fauna habitat features were also noted.



Legend

Threatened Species

- Anabat Location
- Grey-headed Flying-fox
- Grey-headed Flying-foxes
- Koala (no visible tag)
- Koala (tag in left ear)
- Masked Owl
- Koala's identified during activity assessment
- Site Boundary

Figure 4.1

Port Macquarie Base Hospital Threatened Species

Client:	Hassell		
Project:	Part 3A Ecology Assessment		
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Drawn By:	AM	Reviewed By:	MB
Projection:	GDA 1994		
Scale:	Refer to scale bar		

N

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Environmental Resources Management Australia Pty Ltd

Brisbane, Canberra, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

5 RESULTS

5.1 FLORA

The hospital grounds include areas of maintained exotic grassland, planted native and exotic vegetation and remnant native vegetation.

Vegetation within and directly adjoining the proposed development footprint is described in detail below. A total of 101 flora species were identified during the field investigation, 35 (35%) of these were exotic. A detailed list of flora species recorded during the field investigation is located in *Annex A*. No threatened flora species were recorded.

5.1.1 *Blackbutt Tall Open Forest*

This community occurs along the western boundary of the PMBH site within the Oxley Highway road reserve (refer *Figure 4.1*). Within this community, Blackbutt (*Eucalyptus pilularis)* was identified as the dominant species with Tallowwood (*Eucalyptus microcorys*) and Bloodwood (*Corymbia intermedia*) occurring as sub-dominant species. A number of large trees to 30 metres (m) in height and 120 centimetres (cm) diameter at breast height (DBH) were identified within this remnant.

The mid stratum comprised a number of native small tree and shrub species including Black She-oak (*Allocasuarina littoralis*), Sydney Golden Wattle (*Acacia longifolia* subsp. *longifolia*), Scentless Rosewood (*Synoum glandulosum*), Cheese Tree (*Glochidion ferdinandi*), Elderberry Panax (*Polyscias sambucifolia*), Native Peach (*Trema tomentosa*), Native Cherry (*Exocarpos cuppressiformis*), Sweet Pittosporum (*Pittosporum undulatum*), Coffee Bush (*Breynia oblongifolia*), Tantoon (*Leptospermum polygalifolium*), White Dogwood (*Ozothamnus diosmifolius*) and Large-leaf Hop-bush (*Dodonaea triquetra*).

Dominant species identified within the ground stratum were Blady Grass (*Imperata cylindrica*), Kangaroo Grass (*Themeda australis*), Bracken (*Pteridium esculentum*), Spiny-headed Mat-rush (*Lomandra* longifolia), Blue Flax-lily (*Dianella caerulea*) and Indian Pennywort (*Centella asiatica*).

A variety of climbers including Wonga Wonga Vine (*Pandorea pandorana*), Climbing Guinea Flower (*Hibbertia scandens*), Twining Glycine (*Glycine clandestina*), Variable Glycine (*Glycine tabacina*), False Sarsaparilla (*Hardenbergia violacea*), Dusky Coral Pea (*Kennedia rubicunda*), Wombat Berry (*Eustrephus latifolius*), Scrambling Lily (*Geitonoplesium cymosum*), Native Raspberry (*Rubus parvifolius*) and Sweet Sarsparilla (*Smilax glyciphylla*) and a Beard Orchid (*Calochilus* spp.) were also recorded.

Exotic species included Camphor Laurel (*Cinnamomum camphora*), Paspalum (*Paspalum dilatatum*), Lamb's Tongues (*Plantago lanceolata*), Asparagus Fern (*Asparagus aethiopicus*), Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*), Rough Lemon (*Citrus x taitensis*) and Common Passionfruit (*Passiflora edulis*).

Although this community is located directly to the west of the PMBH site, a number of large remnant Blackbutt, Tallowwood and Pink Bloodwood trees are present within the south western corner of the site.

The majority of groundcover within the site is currently maintained as mown lawn however a strip of regrowth vegetation occurs along the western site boundary, to the east of an existing foot path and the road reserve (refer *Figure 4.1*). Small tree, shrub and groundcover species identified within this strip of vegetation are consistent with those identified in the Blackbutt Tall Open Forest community. This section of vegetation showed extensive weed invasion as a result of edge effects.

5.1.2 Rainforest Amenity Area

Vegetation to the north west of the PMBH building (refer *Figure 4.1*) consists of native and exotic species planted as part of the 'PMBH Rainforest Amenity Area' established in 1994. Species identified included Red Cedar (*Toona ciliata*), Blueberry Ash (*Elaeocarpus reticulatus*), Sweet Pittosporum, Macadamia (*Macadamia integrifolia*) and a variety of exotic species such as bromeliads, Plane Tree (*Platanus* spp.), Mickey Mouse Plant (*Ochna serrulata*) and Cobbler's Pegs.

A number of eucalypt trees were also planted in this area including Tallowwood, Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus tereticornis*). The majority of these trees range in height from 8 to 18m and 15 to 40cm DBH.

5.2 FAUNA

5.2.1 Habitat Features

The following potential habitat features were noted within the site and immediate environs during field investigations:

- cleared and regrowth grasslands with native and exotic grasses typically provide a foraging resource for granivorous bird species and macropods;
- myrtaceous tree species e.g. Blackbutt, Tallowwood, Pink Bloodwood, Swamp Mahogany and Forest Red Gum which provide a suitable foraging resource for nectivorous birds and mammals;

- dense ground cover and fallen timber within the Blackbutt Tall Open Forest community and associated regrowth bordering the PMBH site potentially provides suitable shelter for reptiles and small mammals;

- hollows identified in mature eucalypts (predominantly Blackbutts) to the west of the PMBH site potentially provide roosting and nesting habitat for birds, arboreal mammals and microchiropteran bat species;

- Koala feed trees as listed under SEPP 44 and 'primary browse species' as listed under the Port Macquarie-Hastings DCP (eg Tallowwood, Forest Red Gum and Swamp Mahogany) and 'other browse species' as listed under the DCP (eg Blackbutt); and

- She-oak species including Black She-oak outside of the development footprint potentially provide a foraging resource for the Glossy Black-cockatoo (*Calyptorhynchus lathami*) and the Yellow-tailed Black-cockatoo (*Calyptorhynchus funereus*).

Fauna species were recorded opportunistically during field investigations. All fauna species identified within or on land immediately adjacent to the site are listed in *Annex A*.

5.2.2 Diurnal Bird Species

A total of 26 diurnal bird species were recorded opportunistically during the field investigations. A full list of bird species recorded is provided in *Annex A*. This included numerous Rainbow Lorikeets (*Trichoglossus haematodus*) observed foraging amongst flowering Blackbutts within the Blackbutt Tall Open Forest community and a pair of Galahs (*Eolophus roseicapillus*) observed near the opening of a suspected tree hollow within a large Blackbutt, located directly to the west of the PMBH site. It is considered probable that both of these species utilise tree hollows identified in mature eucalypts, to the west of the PMBH site, for nesting purposes. No threatened diurnal bird species were recorded on the site.

5.2.3 Reptiles

Reptiles including a Jacky Lizard (*Amphibolurus muricatus*), Sunskink (*Lampropholis* spp.) and Red-bellied Black Snake (*Pseudechis porphyriacus*) were recorded. No threatened reptiles species were recorded on the site.

5.2.4 Nocturnal Birds and Mammals

A number of nocturnal birds and mammals were identified during spotlighting. On both evenings, the Common Ringtail Possum (*Pseudocheirus peregrinus*) was commonly encountered in the planted rainforest area and also observed in trees bordering the foot path. Grey-headed Flying-foxes (*Pteropus poliocephalus*) were commonly observed flying overhead and foraging within flowering Blackbutt trees. Grey-headed Flying Fox is listed as Vulnerable under the TSC Act. A pair of Tawny Frogmouths (*Podargus strigoides*) was observed within the planted rainforest area on both evenings.

On the night of the 1st November 2011, the Southern Boobook Owl (*Ninox novaeseelandiae*) was heard calling and a Masked Owl (*Tyto novaehollandiae*) was observed near the western boundary of the PMBH site (refer *Figure 4.1*). Masked Owl is listed as Vulnerable under the TSC Act and EPBC Act.

An Eastern Grey Kangaroo (*Macropus giganteus*) was observed traversing the proposed development footprint on the evening of the 15th November 2011 and a previous assessment of the PMBH site (ERM 2010) identified a Sugar Glider (*Petaurus breviceps*) within the Oxley Highway road reserve.

Anecdotal evidence derived from discussions with PMBH staff members during field investigations identified the presence of Foxes (*Vulpes vulpes*) within the immediate environs of the PMBH site.

Koala

Two Koalas were observed during spotlighting activities on the night of the 15th November 2011 (refer *Photo 5.1* and *Photo 5.2*). One of these Koalas was identified as a male and the other was considered likely to be a female. Locations of these observations are shown on *Figure 4.1*. Evidence of Koala habitation (i.e. scats and/or scratches) was observed on many of the planted and remnant eucalypt trees during the field investigations.

Spot assessments were undertaken at three sites around the PMBH. Descriptions of the sites and findings are provided in *Annex A*. Previous assessments (ERM 2010 & 2011) also indicate that the PMBH grounds and surrounding vegetation support a resident population of Koalas with high activity recorded throughout the area, including sighting of an adult and juvenile (refer *Figure 4.1*) that would indicate a viable population.

Photograph 5.1 Male Koala in Tallowwood

Photograph 5.2 Possible Female Koala in Forest Red Gum

A summary of Koala Hospital admission data for areas surrounding the PMBH since 1995 is provided in *Table 5.1*.

Table 5.1 Koala Admission Data for Areas Surrounding the PMBH Since 1995

Location where Injured Koala was Found	Number of Admissions from this Location	Year(s) Admissions were Recorded
Highfield Circuit	3	Between 1998-2011
Merrigal Road	5	Between 2008-2011
Kulai Place	4	Between 1995-2011
Siren Road	4	Between 2002-2011
Oxley Highway (just north of the Wrights Road roundabout)	37	Since 1995
PMBH site (south of Rotary Lodge and north of third pod)	3	2003-2011

Source: Koala Preservation Society 2011

Reasons for admissions to the Koala Hospital varied from chlamydial infection to motor vehicle impact trauma and dog attacks. The majority of admissions from the Oxley Highway (directly west of the PMBH site) were as a result of motor vehicle impact.

Admissions for Merrigal Road include a joey named "Merrigal Flick" admitted to the Koala Hospital on the on the 22nd November 2011, just prior to the consultation meeting. This joey had been abandoned by her mother and was too young to fend for herself and consequently is currently in care.

Microchiropteran Bat Species

Results obtained from ultrasonic bat call detection analysis are summarised in *Table 5.2*.

Table 5.2 Microchiropteran Bat Results

Survey Date	Scientific Name	Common Name	Certainty of Identification
2nd December 2010	*Mormopterus norfolkensis*	Eastern Free-tail Bat*	C
2nd December 2010	*Chalinolobus gouldii*	Gould's Wattled Bat	P
2nd December 2010	*Chalinolobus morio*	Chocolate Wattled Bat	Po
2nd December 2010	*Chalinolobus nigrogriseus*	Hoary Wattled Bat*	Po
2nd December 2010	*Scoteanax rueppellii*	Greater Broad-nosed Bat*	Po
2nd December 2010	*Scotorepens* spp.	Unidentified Long-eared Bat	Po
2nd December 2010	*Vespadelus pumilus*	Eastern Forest Bat	P
2nd December 2010	*Vespadelus vulturnus*	Little Forest Bat	P
1st November 2011	*Mormopterus* spp. 2	East Coast Free-tail Bat	P
1st November 2011	*Chalinolobus gouldii*	Gould's Wattled Bat	C
1st November 2011	*Miniopterus australis*	Little Bentwing-bat*	C
1st November 2011	*Miniopterus*	Eastern Bentwing-	C

Survey Date	Scientific Name	Common Name	Certainty of Identification
	schreibersii oceanensis	bat*	
1st November 2011	*Vespadelus pumilus*	Eastern Forest Bat	P
1st November 2011	*Vespadelus vulturnus*	Little Forest Bat	Po
15th November 2011	*Chalinolobus gouldii*	Gould's Wattled Bat	C
15th November 2011	*Miniopterus australis*	Little Bentwing-bat*	C
15th November 2011	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat*	P
15th November 2011	*Nyctophilus* spp.	Unidentified Long-eared Bat	P

Note: Anabat Data analysed by Glenn Hoye of Fly By Night Bat Surveys

C = confident; P = probable; Po = Possible

* Listed as Vulnerable under the TSC Act.

5.2.5 Fauna Corridors

The PMBH is not mapped as forming a local or regional Koala habitat link in the Draft Hastings KPoM map (Connell Wagner 2000). A review of aerial photographs indicate that the landscaping and retained trees within the PMBH grounds and remnant vegetation in the adjoining Oxley Highway road reserve and along the southern boundary of the PMBH site are connected through a series of narrow corridors to the Lake Innes Nature Reserve in the south east. Lake Innes Nature Reserve is a comparatively large area of native forest.

5.3 THREATENED AND MIGRATORY SPECIES

5.3.1 Threatened Species

A search of the OEH Atlas of NSW Wildlife database (OEH 2011a) revealed that 10 threatened flora species and 46 fauna species had previously been recorded within the locality. An online search of the Commonwealth Protected Matters Search Tool to identify MNES (DSEWPC 2011) identified an additional six threatened flora species and six fauna species had the potential to occur within the locality. The likelihood of these species utilising or inhabiting the site was assessed by comparing known habitat requirements with habitat present (refer *Annex B*).

No threatened flora species were identified during the field investigation and none are expected to occur within the proposed redevelopment area.

A total of eight threatened fauna species were recorded during field investigations including the Masked Owl, Koala, Grey-headed Flying-fox, Eastern Freetail-bat (*Mormopterus norfolkensis*), Hoary Wattled Bat (*Chalinolobus nigrogriseus*), Greater Broad-nosed Bat (Scoteanax rueppellii), Little Bentwing-bat (*Miniopterus australis*) and Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*). These species are all listed as Vulnerable under the TSC Act and the Grey-headed Flying-fox is also listed as Vulnerable under the EPBC Act.

As shown in *Annex B*, the majority of other threatened species identified within the locality were considered to have a low to moderate likelihood of utilising or inhabiting the site based on the absence or limited availability of suitable habitat features and the level of disturbance.

5.3.2 Migratory Species

The Masked Lapwing (*Vanellus miles*) which is listed as Migratory under the EPBC Act, was identified during the field investigation on land currently utilised as an existing helipad.

5.4 ENDANGERED ECOLOGICAL COMMUNITIES

A number of EECs have been identified by the OEH as potentially occurring within the Kempsey and Camden Haven 1:100,000 Map Sheets (refer *Table* 5.3).

Table 5.3 Endangered Ecological Communities Recorded within the Locality

Endangered Ecological Communities	Bioregions
Central Hunter Grey Box – Ironbark Woodland	NSW North Coast and Sydney Basin
Central Hunter Ironbark - Spotted Gum – Grey Box Forest	NSW North Coast and Sydney Basin
Coastal Cypress Pine	NSW North Coast
Coastal Saltmarsh	NSW North Coast, Sydney Basin and South East Corner
Freshwater Wetlands on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Grey Box – Grey Gum Wet Sclerophyll Forest	NSW North Coast
Hunter Floodplain Red Gum Woodland	NSW North Coast and Sydney Basin
Hunter Lowland Redgum Forest	Sydney Basin and NSW North Coast
Hunter Valley Vine Thicket	NSW North Coast and Sydney Basin
Littoral Rainforest	NSW North Coast, Sydney Basin and South East Corner
Lowland Rainforest	NSW North Coast and Sydney Basin
Lowland Rainforest on Floodplains	NSW North Coast
Montane Peatlands and Swamps	New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps
River-Flat Eucalypt Forest on Coastal	NSW North Coast, Sydney Basin and South

Endangered Ecological Communities	Bioregions
Floodplains	East Corner
Subtropical Coastal Floodplain Forest	NSW North Coast
Swamp Oak Floodplain Forest	NSW North Coast, Sydney Basin and South East Corner
Swamp Sclerophyll Forest on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Themeda Grassland on Seacliffs and Coastal Headlands	NSW North Coast, Sydney Basin and South East Corner
White Box Yellow Box Blakely's Red Gum Woodland	-
White Gum Moist Forest	NSW North Coast

Source: DECCW Kempsey (9435) and Camden Haven (9434) 1:100 000 map sheet – 11/10/2011

The likelihood of occurrence of EECs as listed under state and Commonwealth legislation was determined by considering location, landforms, drainage, soils, community structure and dominant plant species and comparing these with known requirements for EECs. Based on this assessment, EECs were not identified within the site and are not expected to occur.

6 IMPACT ASSESSSMENT

The proposed redevelopment of PMBH and associated bushfire asset protection zone would require the removal of approximately 83 eucalypt trees (62 planted and 21 remnant) and approximately 0.1ha of planted rainforest species.

Specific details of trees proposed for removal are provided in the Arborist Report (Naturally Trees 2011) although in general, the planted eucalypt trees range in height from 8-18m and 15-40cm DBH whereas the larger remnant eucalypts are up to 30m in height and 110cm DBH.

No visible hollows were observed within the trees although it is suspected that small hollows (5-10cm diameter) may be present in the upper branches of some of the larger eucalypts in the south eastern corner of the PMBH site.

Eucalypt trees to be removed included recognised Koala feed tree species (Tallowwood, Forest Red Gum, Swamp Mahogany and Blackbutt) known to provide a suitable foraging resource for a viable local Koala population.

No threatened flora species were observed within the proposed development footprint and vegetation is not considered to be part of an EEC under the NSW TSC Act or Commonwealth EPBC Act. However, surveys revealed the presence of a number of threatened fauna species within the PMBH site and immediate environs.

The potential for the proposed redevelopment to impact upon threatened species has been assessed in accordance with the requirements of the TSC Act and Commonwealth EPBC Act (refer *Section 6.1* and *Section 6.2*).

6.1 COMMONWEALTH EPBC ACT ASSESSMENT

The Commonwealth EPBC Act requires approval for actions that may have a significant impact on MNES. *Table 6.1* details EPBC Act listed threatened and migratory species that were considered to have the potential to be impacted by the proposal, based on the results of the habitat assessment (refer *Annex B*) and field investigations.

Table 6.1 EPBC Act Listed Threatened and Migratory Species Considered to be Potentially Impacted by the Proposal

Common Name	Scientific Name	EPBC Act Status
Threatened Species:		
Grey-headed Flying-fox	*Pteropus poliocephalus*	V
Migratory Species:		
Masked Lapwing	*Vanellus miles*	M

EPBC Act = *Environmental Protection and Biodiversity Conservation Act 1999*
V = Vulnerable; M = Migratory

6.1.1 *Threatened Species*

An assessment was undertaken for the Grey-headed Flying-fox in accordance with *EPBC Act Policy Statement 1.1: Significant Impact Guidelines* (DEH 2006) (refer *Annex C*).

Assessment showed that although the proposal would result in the removal of foraging habitat, it was not expected to have a significant impact on an 'important population' of this highly mobile species given the prevalence of similar vegetation within the locality, including the presence of higher quality foraging habitat surrounding Lake Innes Nature Reserve.

6.1.2 *Migratory Species*

Given the nature of the proposal and the fact that migratory species identified within the site are considered to be wide-ranging with generalist habitat requirements, it was determined that the proposal is unlikely to have a significant impact on the Masked Lapwing as it was not considered to:

- substantially modify, destroy or isolate an area of important habitat for these species;
- result in harmful invasive species becoming established within the site; or
- seriously disrupt the life cycle of an ecologically significant proportion of a population of the species.

Consequently, further assessment under the EPBC Act is not required.

6.2 *NSW TSC ACT ASSESSMENT*

Section 5A of the EP&A Act, as amended by the TSC Act, outlines an assessment process for determining whether a proposed action is likely to have a significant impact on a state listed threatened species, endangered population or EEC. *Table 6.2* details TSC Act listed threatened species and EECs that were considered to have the potential to be impacted by the proposal, based on the results of the habitat assessment (refer *Annex B*) and field investigations.

Table 6.2 ***TSC Act Listed Threatened Species Considered to be Potentially Impacted by the Proposal***

Common Name	Scientific Name	TSC Act Status
Masked Owl	*Tyto novaehollandiae*	V
Koala	*Phascolarctos cinereus*	V
Grey-headed Flying-fox	*Pteropus poliocephalus*	V
Little Bentwing-bat	*Miniopterus australis*	V
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V
Eastern Freetail-bat	*Mormopterus norfolkensis*	V
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V

TSC Act = *Threatened Species Conservation Act 1995*; V = Vulnerable

Assessment of the potential for the proposed action to impact upon threatened species and EECs listed in *Table 6.2* was undertaken in accordance with the seven factors outlined in Section 5A of the EP&A Act (known as the '7-part test' or 'Assessment of Significance') (refer *Annex D*).

The assessment showed that the proposal would impact upon the local foraging behaviour and resources of the species listed in *Table 6.2*, in particular the Koala. With the adoption of mitigation measures outlined in *Chapter 7*, the proposal is considered unlikely to have a significant impact on threatened species such that a viable local population would be placed at risk of extinction in the long-term.

7 MITIGATION MEASURES

The following measures are recommended to further reduce the potential for impact as a result of the proposed action:

- minimise vegetation clearance through delineation of designated construction areas and access tracks to protect native vegetation located adjacent to areas of impact;

- prior to and during removal of Koala feed trees implement measures to avoid impacting on individuals including pre-clearance inspection of trees for Koalas;

- ensure an ecologist is present during vegetation removal to relocate any identified fauna to a safe location, conduct post-clearing inspection of potential tree hollows and rescue any injured fauna;

- implement erosion and sediment control measures in accordance with an Environmental Management Plan (EMP) to prevent sedimentation of surrounding vegetation; and

- control weeds in accordance with an EMP during and following construction to avoid the spread of weeds.

Compensatory planting of Koala feed trees at a minimum ratio of 2:1 and in a suitable location is recommended to minimise impacts associated with loss of Koala foraging habitat. Due to limited space availability within the PMBH site, an appropriate off-site location would need to be identified to accommodate compensatory planting that cannot be located within the confines of the PMBH. Details regarding the location, species and quantities of plantings may be developed in consultation with the Koala Preservation Society and other relevant authorities.

With the adoption of these mitigation measures, the proposed action is considered unlikely to have a significant impact on threatened species as listed under Commonwealth or State legislation such that a viable population is at risk of extinction.

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Annex A

Species List

Table A.1 Flora Species Recorded within the Site

Family	Scientific Name	Common Name	Legal Status	
			TSC Act	EPBC Act
AMARYLLIDACEAE	*Hippeastrum* spp.*	Hippeastrum	-	-
ANTHERICACEAE	*Tricoryne elatior*	Yellow Autumn-lily	-	-
APIACEAE	*Centella asiatica*	Indian Pennywort	-	-
APIACEAE	*Cyclospermum leptophyllum**	Slender Celery	-	-
APIACEAE	*Hydrocotyle peduncularis*	A Pennywort	-	-
APOCYNACEAE	*Gomphocarpus fruticosus**	Narrow-leaved Cotton Bush	-	-
ARALIACEAE	*Polyscias sambucifolia*	Elderberry Panax	-	-
ASPARAGACEAE	*Asparagus aethiopicus**	Asparagus Fern	-	-
ASTERACEAE	*Bidens pilosa**	Cobbler's Pegs	-	-
ASTERACEAE	*Cassinia uncata*	Sticky Cassinia	-	-
ASTERACEAE	*Chrysanthemoides monilifera* subsp. *rotundata**	Bitou Bush	-	-
ASTERACEAE	*Conyza bonariensis**	Flaxleaf Fleabane	-	-
ASTERACEAE	*Gamochaeta* spp.*	Cudweed	-	-
ASTERACEAE	*Hypochaeris radicata**	Catsear	-	-
ASTERACEAE	*Ozothamnus diosmifolius*	White Dogwood	-	-
ASTERACEAE	*Senecio madagascariensis**	Fireweed	-	-
ASTERACEAE	*Soliva* spp.*	Bindyi	-	-
ASTERACEAE	*Sonchus oleraceus**	Common Sowthistle	-	-
ASTERACEAE	*Taraxacum officinale**	Dandelion	-	-
BIGNONIACEAE	*Pandorea pandorana*	Wonga Wonga Vine	-	-
CARYOPHYLLACEAE	*Cerastium glomeratum**	Mouse-ear Chickweed	-	-
CASUARINACEAE	*Allocasuarina littoralis*	Black She-oak	-	-
CONVOLVULACEAE	*Dichondra repens*	Kidney Weed	-	-
CONVOLVULACEAE	*Ipomoea cairica**	Coastal Morning Glory	-	-
CONVOLVULACEAE	*Polymeria calycina*	-	-	-
CUPRESSACEAE	*Callitris macleayana*	Stringybark Pine	-	-
CUPRESSACEAE	*Callitris rhomboidea*	Port Jackson Pine	-	-
DENNSTAEDTIACEAE	*Pteridium esculentum*	Bracken	-	-
DILLENIACEAE	*Hibbertia scandens*	Climbing Guinea Flower	-	-
ELAEOCARPACEAE	*Elaeocarpus reticulatus*	Blueberry Ash	-	-

Family	Scientific Name	Common Name	Legal Status	
			TSC Act	EPBC Act
ERICACEAE	*Leucopogon juniperinus*	Prickly Beard-heath	-	-
EUPHORBIACEAE	*Breynia oblongifolia*	Coffee Bush	-	-
EUPHORBIACEAE	*Glochidion ferdinandi*	Cheese Tree	-	-
FABACEAE (FABOIDEAE)	*Daviesia genistifolia*	Broom Bitter Pea	-	-
FABACEAE (FABOIDEAE)	*Glycine clandestina*	Twining Glycine	-	-
FABACEAE (FABOIDEAE)	*Glycine tabacina*	Variable Glycine	-	-
FABACEAE (FABOIDEAE)	*Hardenbergia violacea*	False Sarsaparilla	-	-
FABACEAE (FABOIDEAE)	*Kennedia rubicunda*	Dusky Coral Pea	-	-
FABACEAE (FABOIDEAE)	*Medicago* spp.*	Medic	-	-
FABACEAE (FABOIDEAE)	*Pultenaea retusa*	-	-	-
FABACEAE (FABOIDEAE)	*Trifolium repens**	White Clover	-	-
FABACEAE (FABOIDEAE)	*Vicia sativa**	Common Vetch	-	-
FABACEAE (MIMOSOIDEAE)	*Acacia falcata*	-	-	-
FABACEAE (MIMOSOIDEAE)	*Acacia fimbriata*	Fringed Wattle	-	-
FABACEAE (MIMOSOIDEAE)	*Acacia implexa*	Hickory Wattle	-	-
FABACEAE (MIMOSOIDEAE)	*Acacia longifolia* subsp. *longifolia*	Sydney Golden Wattle	-	-
HALORAGACEAE	*Gonocarpus teucrioides*	Germander Raspwort	-	-
IRIDACEAE	*Romulea rosea* var. *australis**	Onion Grass	-	-
LAURACEAE	*Cassytha pubescens*	Downy Dodder-laurel	-	-
LAURACEAE	*Cinnamomum camphora**	Camphor Laurel	-	-
LOBELIACEAE	*Pratia purpurascens*	Whiteroot	-	-
LOMANDRACEAE	*Lomandra longifolia*	Spiny-headed Mat-rush	-	-
LUZURIAGACEAE	*Eustrephus latifolius*	Wombat Berry	-	-
LUZURIAGACEAE	*Geitonoplesium cymosum*	Scrambling Lily	-	-
MALVACEAE	*Malva parviflora**	Small-flowered Mallow	-	-
MALVACEAE	*Modiola caroliniana**	Red-flowered Mallow	-	-
MALVACEAE	*Sida rhombifolia**	Paddy's Lucerne	-	-
MELIACEAE	*Synoum glandulosum*	Scentless Rosewood	-	-
MELIACEAE	*Toona ciliata*	Red Cedar	-	-

Family	Scientific Name	Common Name	Legal Status	
			TSC Act	EPBC Act
MYRSINACEAE	*Anagallis arvensis**	Scarlet Pimpernel	-	-
MYRTACEAE	*Acmena smithii*	Lilly Pilly	-	-
MYRTACEAE	*Corymbia intermedia*	Pink Bloodwood	-	-
MYRTACEAE	*Eucalyptus microcorys*	Tallowwood	-	-
MYRTACEAE	*Eucalyptus pilularis*	Blackbutt	-	-
MYRTACEAE	*Eucalyptus robusta*	Swamp Mahogany	-	-
MYRTACEAE	*Eucalyptus tereticornis*	Forest Red Gum	-	-
MYRTACEAE	*Leptospermum polygalifolium*	Tantoon	-	-
MYRTACEAE	*Melaleuca linariifolia*	Flax-leaved Paperbark	-	-
MYRTACEAE	*Melaleuca styphelioides*	Prickly-leaved Tea Tree	-	-
NYCTAGINACEAE	*Bougainvillea* spp.*	Bougainvillea	-	-
OCHNACEAE	*Ochna serrulata**	Mickey Mouse Plant	-	-
ORCHIDACEAE	*Calochilus* spp.	Beard Orchid	-	-
PASSIFLORACEAE	*Passiflora edulis**	Common Passionfruit	-	-
PHORMIACEAE	*Dianella caerulea*	Blue Flax-lily	-	-
PITTOSPORACEAE	*Billardiera scandens*	Hairy Apple Berry	-	-
PITTOSPORACEAE	*Pittosporum revolutum*	Rough Fruit Pittosporum	-	-
PITTOSPORACEAE	*Pittosporum undulatum*	Sweet Pittosporum	-	-
PLANTAGINACEAE	*Plantago lanceolata**	Lamb's Tongues	-	-
POACEAE	*Briza minor**	Shivery Grass	-	-
POACEAE	*Bromus catharticus**	Prairie Grass	-	-
POACEAE	*Echinopogon* spp.	A Hedgehog Grass	-	-
POACEAE	*Entolasia* spp.	Panic	-	-
POACEAE	*Imperata cylindrica*	Blady Grass	-	-
POACEAE	*Oplismenus* spp.	Basket Grass	-	-
POACEAE	*Paspalum dilatatum**	Paspalum	-	-
POACEAE	*Pennisetum clandestinum**	Kikuyu Grass	-	-
POACEAE	*Themeda australis*	Kangaroo Grass	-	-
PODOCARPACEAE	*Podocarpus elatus*	Plum Pine	-	-
PROTEACEAE	*Hakea salicifolia*	Willow-leaved Hakea	-	-
RHAMNACEAE	*Pomaderris* spp.	-	-	-
ROSACEAE	*Rubus moluccanus* var. *trilobus*	Molucca Bramble	-	-
ROSACEAE	*Rubus parvifolius*	Native Raspberry	-	-

Family	Scientific Name	Common Name	Legal Status	
			TSC Act	EPBC Act
RUTACEAE	*Citrus x taitensis**	Rough Lemon	-	-
SANTALACEAE	*Exocarpos cupressiformis*	Native Cherry	-	-
SAPINDACEAE	*Dodonaea triquetra*	Large-leaf Hop-bush	-	-
SMILACACEAE	*Smilax glyciphylla*	Sweet Sarsparilla	-	-
THYMELAEACEAE	*Pimelea linifolia*	Slender Rice Flower	-	-
THYMELAEACEAE	*Wikstroemia indica*	-	-	-
ULMACEAE	*Trema tomentosa*	Native Peach	-	-
VERBENACEAE	*Lantana camara**	Lantana	-	-
VERBENACEAE	*Verbena rigida**	Veined Verbena	-	-

* denotes introduced species

Table A.2 Fauna Species Recorded within the Site

Family	Scientific Name	Common Name	Legal Status	
			TSC Act	EPBC Act
Reptiles				
AGAMIDAE	*Amphibolurus muricatus*	Jacky Lizard	-	-
ELAPIDAE	*Pseudechis porphyriacus*	Red-bellied Black Snake	-	-
SCINCIDAE	*Lampropholis* spp.	Sunskink	-	-
Birds				
ALCEDINIDAE	*Dacelo novaeguineae*	Laughing Kookaburra	-	-
ARTAMIDAE	*Cracticus tibicen*	Australian Magpie	-	-
ARTAMIDAE	*Cracticus torquatus*	Grey Butcherbird	-	-
CACATUIDAE	*Eolophus roseicapillus*	Galah	-	-
CAMPEPHAGIDAE	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	-	-
CHARADRIIDAE	*Vanellus miles*	Masked Lapwing	-	M
COLUMBIDAE	*Columba leucomela*	White-headed Pigeon	-	-
COLUMBIDAE	*Streptopelia chinensis**	Spotted Turtle-dove	-	-
CORACIIDAE	*Eurystomus orientalis*	Dollarbird	-	-
CUCULIDAE	*Scythrops novaehollandiae*	Channel-billed Cuckoo	-	-
DICRURIDAE	*Dicrurus bracteatus*	Spangled Drongo	-	-
HIRUNDINIDAE	*Hirundo neoxena*	Welcome Swallow	-	-
MELIPHAGIDAE	*Anthochaera carunculata*	Red Wattlebird	-	-
MELIPHAGIDAE	*Anthochaera chrysoptera*	Little Wattlebird	-	-

			Legal Status	
MELIPHAGIDAE	*Manorina melanocephala*	Noisy Miner	-	-
MELIPHAGIDAE	*Philemon corniculatus*	Noisy Friarbird	-	-
MONARCHIDAE	*Grallina cyanoleuca*	Magpie-lark	-	-
ORIOLIDAE	*Oriolus sagittatus*	Olive-backed Oriole	-	-
ORIOLIDAE	*Sphecotheres vieilloti*	Australasian Figbird	-	-
PARDALOTIDAE	*Pardalotus striatus*	Striated Pardalote	-	-
PASSERIDAE	*Passer domesticus**	House Sparrow	-	-
PODARGIDAE	*Podargus strigoides*	Tawny Frogmouth	-	-
PSITTACIDAE	*Trichoglossus haematodus*	Rainbow Lorikeet	-	-
PSOPHODIDAE	*Psophodes olivaceus*	Eastern Whipbird	-	-
PTILONORHYNCHIDAE	*Ptilonorhynchus violaceus*	Satin Bowerbird	-	-
STRIGIDAE	*Ninox novaeseelandiae*	Southern Boobook	-	-
STURNIDAE	*Sturnus tristis**	Common Myna	-	-
TYTONIDAE	***Tyto novaehollandiae***	**Masked Owl**	**V**	**-**
Mammals				
CANIDAE	*Vulpes vulpes**	Fox	-	-
MACROPODIDAE	*Macropus giganteus*	Eastern Grey Kangaroo	-	-
MOLOSSIDAE	***Mormopterus norfolkensis***	**Eastern Freetail-bat**	**V**	**-**
PETAURIDAE	*Petaurus breviceps*	Sugar Glider	-	-
PHASCOLARCTIDAE	***Phascolarctos cinereus***	**Koala**	**V**	**-**
PSEUDOCHEIRIDAE	*Pseudocheirus peregrinus*	Common Ringtail Possum	-	-
PTEROPODIDAE	***Pteropus poliocephalus***	**Grey-headed Flying-fox**	**V**	**V**
VESPERTILIONIDAE	*Chalinolobus gouldii*	Gould's Wattled Bat	-	-
VESPERTILIONIDAE	*Chalinolobus morio*	Chocolate Wattled Bat	-	-
VESPERTILIONIDAE	***Chalinolobus nigrogriseus***	**Hoary Wattled Bat**	**V**	**-**
VESPERTILIONIDAE	***Miniopterus australis***	**Little Bentwing-bat**	**V**	**-**
VESPERTILIONIDAE	***Miniopterus schreibersii oceanensis***	**Eastern Bentwing-bat**	**V**	**-**
VESPERTILIONIDAE	*Nyctophilus spp.*	Unidentified Long-eared Bat	-	-
VESPERTILIONIDAE	***Scoteanax rueppellii***	**Greater Broad-nosed Bat**	**V**	**-**

			Legal Status	
VESPERTILIONIDAE	*Scotorepens spp.*	Unidentified Broad-nosed Bat	-	-
VESPERTILIONIDAE	*Vespadelus pumilus*	Eastern Forest Bat	-	-
VESPERTILIONIDAE	*Vespadelus vulturnus*	Little Forest Bat	-	-

* denotes introduced species; V = Vulnerable; M = Migratory

A.1 SPOT ASSESSMENT DISCUSSION EXTRACT FROM ERM (2010)

Note that the following discussion was extracted from preliminary investigations for the project and refers to a preliminary development footprint.

Table A.3 Results from Koala Spot Activity Assessments (ERM 2010)

SAT Site	Koala Feed Trees (%)	Mean DBH (cm)	Scratches (%)	Pellets (%)	Mean Tree Height (m)	SAT Activity Level
A	63	33	73	37	10	High
B	37	54	87	40	16	High
C	73	34	73	23	13	Medium

1. Feed trees are those only those which are listed under Schedule 2 of SEPP 44.
2. At each of the SAT sites 30 trees were considered.
3. Pellets were searched for a maximum of two person minutes and 100cm from the base of each tree.

SAT A

This area was selected as clearance of several trees may be necessary at the northern end of the main development footprint. The area is landscaped with planted Schedule 2 Koala feed trees which comprised 63% of the trees identified, with Tallowwood dominant and several Swamp Mahogany trees present. Almost three quarters of the trees (73%) had Koala scratches on the trunks with pellets found at the base of 37% of the trees. This corresponds with high use as described in Phillips and Callaghan (refer to *Table A.3*).

SAT B

This was selected as it is close to the main development and may be subjected to some disturbance including potentially lopping of branches. This site supported less Koala feed trees with comparatively more Blackbutts, Grey Ironbark and Pink Bloodwood. Tallowwood was the most common Koala feed tree with one Swamp Mahogany included. Despite the fewer feed trees Koala activity was marginally higher than SAT A with 40% of the trees with Koala pellets; this corresponds to high use according to the SAT activity assessment. The majority of the trees have significant koala scratch marks on

the trunk (87%). This area has mature trees and good connectivity to the road reserve and southern vegetation strip.

SAT C

This area was closest to the area identified as Core Koala Habitat in the Port Macquarie-Hastings LEP. The mapped area has since been cleared and developed, so the closest potential habitat was selected. Koala feed trees comprised 73% of the trees surveys which were all Tallowwoods. Despite the high amount of Koala feed trees fewer pellets were found and correspondingly the SAT activity was lower with a medium activity level. It is expected that this may be an artefact of sampling as the understory was comparatively dense with deep leaf litter. The substrate was also wet which provided less contrast, making the scats less visible. The amount of scratches was comparable to the other two SAT sites and two Koalas were observed close to this area. It is expected that this area is comparable to the other SAT site and utilised as frequently by Koalas.

Annex B

Threatened Species Habitat Assessment

Table A.1 Likelihood of Occurrence of Threatened Species

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
FLORA							
Acronychia littoralis Scented Acronychia	E	E	Y	N	Found between Fraser Island in Queensland and Port Macquarie in NSW where it grows in littoral rainforest on sand (OEH 2011b).	Not expected given absence of habitat elements.	No
Allocasuarina defungens Dwarf Heath Casuarina	E	E	Y	Y	Found only in NSW from the Nabiac area to Byron Bay on the NSW north coast where it grows mainly in tall heath on sand, but can also occur on clay soils and sandstone. Also extends onto exposed nearby-coastal hills or headlands adjacent to sandplains (OEH 2011b).	Not expected given absence of habitat elements.	No
Arthraxon hispidus Hairy Jointgrass	V	V	N	Y	Within NSW, found on the Northern Tablelands and North Coast. Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (OEH 2011b).	Not expected given absence of habitat elements.	No
Asperula asthenes Trailing Woodruff	V	V	Y	N	Occurs only in NSW in scattered locations from Bulahdelah, north to near Kempsey, with several records from the Port Stephens/Wallis Lake area. Inhabits damp sites, often along river banks (OEH 2011b).	Not expected given absence of habitat elements.	No
Chamaesyce psammogeton Sand Spurge	E	-	Y	-	Occurs in sparse distribution along the coast from south of Jervis Bay to Queensland where it is found on fore-dunes and exposed headlands, often with Spinifex (*Spinifex sericeus*) (OEH 2011b).	Not expected given absence of habitat elements.	No
Cryptostylis hunteriana Leafless Tongue-orchid	V	V	N	Y	Observed in recent years at many sites between Batemans Bay and Nowra on the NSW South Coast (although it is uncommon at all sites). Also recorded at Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park	Not expected given absence of habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					and Ben Boyd National Park. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. Larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*). Appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*) (OEH 2011b).		
Cynanchum elegans White-flowered Wax Plant	E	E	Y	Y	Restricted to eastern NSW where it is distributed from Brunswick Heads on the North Coast to Gerroa in the Illawarra region. Usually occurs on the edge of dry rainforest vegetation though may be associated with other vegetation types including littoral rainforest; Coastal Tea-tree (*Leptospermum laevigatum*) – Coastal Banksia (*Banksia integrifolia*) coastal scrub; Forest Red Gum (*Eucalyptus tereticornis*) aligned open forest and woodland; Spotted Gum (*Corymbia maculata*) aligned open forest and woodland; and Bracelet Honeymyrtle (*Melaleuca armillaris*) scrub to open scrub (OEH 2011b).	Not expected given absence of habitat elements.	No
Dendrobium melaleucaphilum Spider Orchid	E	-	Y	-	Occurs in coastal districts and nearby ranges, extending from Queensland to its southern distributional limit in the lower Blue Mountains. Frequently found growing on Prickly-leaved Tea-tree (*Melaleuca styphelioides*) and less commonly on rainforest trees and rocks in coastal districts (OEH 2011b).	Low likelihood of occurrence.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Euphrasia arguta	PD CE	CE	N	Y	Grows in grassy areas near rivers. Recorded from Bathurst to Walcha, possibly extinct (RBG 2011). Preliminary determination as CE following rediscovery of four populations in the Nundle area in 2008. Distribution highly restricted to rediscovered records.	Not expected given absence of habitat elements.	No
Maundia triglochinoides	V	-	Y	-	Restricted to coastal NSW, north from Wyong extending into southern Queensland. Grows in swamps, creeks or shallow freshwater (30-60cm deep) on heavy clay with low nutrients (OEH 2011b).	Not expected given absence of habitat elements.	No
Melaleuca biconvexa Biconvex Paperbark	V	V	Y	Y	Only found in NSW, with scattered populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects (OEH 2011b).	Not expected given absence of habitat elements.	No
Oberonia titania Red-flowered King of the Fairies	V	-	Y	-	Occurs on the NSW north coast, north from Kendall, and also in Queensland and Norfolk Island. Found in littoral and subtropical rainforest and paperbark swamps although also known from eucalypt-forested gorges and in mangroves (OEH 2011b).	Not expected given absence of habitat elements.	No
Parsonsia dorrigoensis Milky Silkpod	V	E	N	Y	Found only within NSW, with scattered populations in the North Coast region between Kendall and Woolgoolga. Grows in subtropical and warm-temperature rainforest, on rainforest margins, and in moist eucalypt forest up to 800m, on brown clay soils (OEH 2011b).	Low likelihood of occurrence in remnant vegetation in road reserve. Not expected in development footprint.	No
Sophora tomentosa Silverbush	E	-	Y	-	Occurs in coastal areas in Queensland and northern NSW on coastal dunes, north of Old Bar, near Taree with the largest known population at Port Macquarie (OEH 2011b).	Not expected given absence of habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Taeniophyllum muelleri Minute Orchid	-	V	N	Y	Grows on outer branches and branchlets of rainforest trees within the coast and coastal ranges of northern NSW, from sea level to 250m (RBG 2011).	Not expected given absence of habitat elements.	No
Thesium australe Austral Toadflax	V	V	N	Y	Scattered distribution across eastern NSW, along the coast, and from the Northern to Southern Tablelands where it occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*) (OEH 2011b).	Not expected given absence of habitat elements.	No
INSECTS							
Petalura gigantea Giant Dragonfly	E	-	Y	-	Found along coastal NSW from the Victorian border to northern NSW. Does not occur west of the Great Dividing Range. Lives in permanent swamps and bogs that contain some free water and open vegetation (OEH 2011b).	Not expected given absence of habitat elements.	No
AMPHIBIANS							
Crinia tinnula Wallum Froglet	V	-	Y	-	Found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country (OEH 2011b).	Not expected given absence of habitat elements.	No
Litoria aurea Green and Golden Bell Frog	E	V	Y	Y	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available (OEH 2011b).	Not expected given absence of habitat elements	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Litoria brevipalmata Green-thighed Frog	V	-	Y	-	Known from isolated localities along the coast and ranges from just north of Wollongong to south-east Queensland. Occupy a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. Thought to forage in leaf-litter and known to aggregate around semi-permanent ponds and flood-prone grassy areas during breeding (OEH 2011b).	Not expected given absence of habitat elements.	No
Mixophyes iteratus Giant Barred Frog	E	E	N	Y	Forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. They breed around shallow, flowing rocky streams from late spring to summer (OEH 2011b).	Not expected given absence of habitat elements.	No
BIRDS							
Anthochaera phrygia Regent Honeyeater	CE	E	Y	Y	Mainly found on the inland slopes of south-east Australia in dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak which support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Key eucalypt species include Mugga Ironbark (*Eucalyptus sideroxylon*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*), White Box (*E. albens*) and Swamp Mahogany (*E. robusta*). Also utilises: Western Grey Box (*E. macrocarpa*), Grey Gum (*E. punctata*), Red Box (*E. polyanthemos*), Grey Box (*E. moluccana*), Swamp Mahogany (*E. robusta*), Narrow-leaved Ironbark (*E. crebra*), *E. caleyi*, Spotted Gum (*Corymbia maculata*), McKie's Stringybark (*E. mckieana*), Red Stringybark (*E. macrorhyncha*), Silver-top Stringybark (*E. laevopinea*) and Rough-barked Apple (*Angophora floribunda*).	Low likelihood of foraging on a seasonal basis in road reserve. Not expected in development footprint.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					Nectar and fruit from the mistletoes *Amyema miquelii*, *A. pendula* and *A. cambagei* are also eaten during the breeding season. A shrubby understorey is an important source of insects and nesting material. Nest in horizontal branches or forks in tall mature eucalypts and sheoaks and also nest in mistletoe haustoria. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the Central Coast and occasionally on the upper North Coast (OEH 2011b).		
Botaurus poiciloptilus Australasian Bittern	E	-	Y	Y	In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleoacharis* spp.). Hides during the day amongst dense reeds or rushes and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails. Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds (OEH 2011b).	Not expected given absence of habitat elements.	No
Burhinus grallarius Bush Stone-curlew	E	-	Y	-	Found throughout Australia except for the central southern coast and inland, the far south-east corner and Tasmania. Rare within the south-eastern portion of its range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber (OEH 2011b).	Low likelihood of occurrence. Not expected in development footprint.	No
Calyptorhynchus lathami Glossy Black-Cockatoo	V	-	Y	-	Occurs from the central Queensland coast to East Gippsland in Victoria and inland to the southern tablelands and central western plains of NSW. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of She-oak species, particularly Black She-oak (*Allocasuarina*	Low to moderate given presence of Black She-oak within the road reserve. No Black She-oak specimens or large hollows	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					littoralis), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. Dependent on large hollow-bearing eucalypts for nest sites (OEH 2011b).	observed within the proposed development footprint.	
Charadrius mongolus Lesser Sand-plover	V	-	Y	-	Almost entirely coastal in NSW with individuals rarely recorded inland or south of the Shoalhaven estuary. Favours the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats. Occassionally occurs on sandy beaches, coral reefs and rock platforms (OEH 2011b).	Not expected given absence of habitat elements.	No
Circus assimilis Spotted Harrier	V	-	Y	-	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. Found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands (OEH 2011b).	Low likelihood of occurrence given absence of preferred habitat.	No
Climacteris picumnus Brown Treecreeper	V	-	Y	-	Occurs in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains of the Great Dividing Range. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey and sometimes with one or more shrub species. Also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Usually not found in woodlands with a dense shrub layer. Less commonly recorded in similar woodland habitats on coastal plains and ranges (OEH 2011b).	Not expected given absence of preferred habitat.	No
Coracina lineata Barred Cuckoo-shrike	V	-	Y	-	Rare in NSW although range extends north from the Manning River to Queensland. Inhabits rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands	Low to moderate likelihood in remnant vegetation.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					and timber along watercourses (OEH 2011b).		
Daphoenositta chrysoptera Varied Sittella	V	-	Y	-	Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (OEH 2011b).	Low to moderate likelihood of occurrence in remnant vegetation in road reserve.	No
Ephippiorhynchus asiaticus Black-necked Stork	E	-	Y	-	Widespread across coastal northern and eastern Australia, becoming increasingly uncommon further south into NSW, and rarely south of Sydney. Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water and nests in a live or dead tree, in or near a freshwater swamp (OEH 2011b).	Not expected given absence of habitat elements.	No
Glossopsitta pusilla Little Lorikeet	V	-	Y	-	Inhabits tall open forest and woodland and large trees in open country. Nests in small hollows in eucalypts (Pizzey & Knight 1997).	Low to moderate likelihood of occurrence in remnant vegetation in road reserve.	No
Haematopus fuliginosus Sooty Oystercatcher	V	-	Y	-	Found around the entire Australian coast. Favour rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries (OEH 2011b).	Not expected given absence of habitat elements.	No
Haematopus longirostris Pied Oystercatcher	E	-	Y	-	In NSW, this species is thinly scattered along the entire coast. Favours intertidal flats on inlets and bays, open beaches and sandbanks. Nests mostly on coastal or estuarine beaches although occasionally use saltmarsh or grassy areas (OEH 2011b).	Not expected given absence of habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Hieraaetus morphnoides Little Eagle	V	-	Y	-	Found throughout the Australian mainland except for the most densely forested parts of the Dividing Range escarpment. Inhabits open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees in remnant vegetation.	Low to moderate likelihood of occurrence.	No
Ixobrychus flavicollis Black Bittern	V	-	Y	-	Within NSW, records of this species are scattered along the east coast with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation including flooded grassland, forest, woodland, rainforest and mangroves (OEH 2011b).	Not expected given absence of habitat elements.	No
Lathamus discolour Swift Parrot	E	E	Y	Y	Migrating in the autumn and winter months to south-eastern Australia. In NSW, mostly occurs on the coast and south west slopes in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*) and White Box (*E. albens*). Commonly used lerp infested trees include Grey Box (*E. microcarpa*), Grey Box (*E. moluccana*) and Blackbutt (*E. pilularis*) (OEH 2011b).	Low to moderate likelihood of foraging in large Blackbutts in road reserve. Not expected in development footprint.	No
Lophoictinia isura Square-tailed Kite	V	-	Y	-	In NSW, scattered records indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems where it is found in a variety of timbered habitats including dry woodlands and open forests and shows a particular preference for timbered watercourses. Nest sites are generally	Known nest sites nearby. May forage throughout locality as part of large territory. Not expected in development footprint.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					located along or near watercourses, in a fork or on large horizontal limbs (OEH 2011b).		
Ninox strenua Powerful Owl	V	-	Y	-	Within NSW, this species is widely distributed throughout the eastern forests from the coast inland to the tablelands with scattered, historical records from the western slopes and plains. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. Generally requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black she-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart (*Exocarpus cuppressiformis*) and a number of eucalypt species. Nest in large tree hollows (at least 0.5m deep), in large eucalypts (DBH of 80-240cm) that are at least 150 years old. As most prey species (eg possums, gliders, birds, flying-fox) require hollows and a shrub layer, these are important habitat components (OEH 2011b).	Low to moderate likelihood of occurrence. No suitable roosting or nesting habitat although may forage throughout the locality as part of a larger home range.	No
Oxyura australis Blue-billed Duck	V	-	Y	-	Within NSW, this species is most common in the southern Murray-Darling Basin area and is generally only seen in coastal areas during summer or in drier years. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. Completely aquatic, this species usually nests solitarily in Cumbungi over deep water although also nests in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl nest is constructed (OEH 2011b).	Not expected given absence of habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Pandion haliaetus Osprey	V	-	Y	-	Found around the Australian coastline except for Victoria and Tasmania. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea (OEH 2011b).	Not expected given absence of habitat elements.	No
Petroica boodang Scarlet Robin	V	-	Y	-	Within NSW, this species occurs from the coast to the inland slopes although may also be found on the lower valleys and plains of the tablelands during autumn and winter. Inhabits dry eucalypt forests and woodlands containing an open and grassy understorey comprising few scattered shrubs. Lives in both mature and regrowth vegetation, occasionally occurring within mallee or wet forest communities or in wetlands and tea-tree swamps. Abundant logs and fallen timber are important habitat components. Nests are built in the fork of a tree (often dead or partially dead), usually more than two metres from the ground (OEH 2011b).	Low likelihood given absence of preferred elements.	No
Ptilinopus magnificus Wompoo Fruit-dove	V	-	Y	-	Occurs along the coast and ranges from the Hunter River in NSW to Cape York Peninsula in Queensland. Rare south of Coffs Harbour. Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Most often recorded in mature forests although also found in remnant and regenerating rainforest. Feeds on a diverse range of tree and vine fruits (OEH 2011b).	Low to moderate likelihood given absence of preferred habitat.	No
Ptilinopus regina Rose-crowned Fruit-dove	V	-	Y	-	Found along the coast and ranges of eastern NSW and Queensland from Newcastle, north to Cape York. Occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest where fruit is plentiful (OEH	Low to moderate likelihood given absence of preferred habitat.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					2011b).		
Rostratula australis Australian Painted Snipe	E	V	N	Y	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water (OEH 2011b).	Not expected given absence of habitat elements.	No
Sterna albifrons Little Tern	E	-	Y	-	Within NSW, this species occurs mainly north of Sydney, generally appearing from September until May. Almost exclusively coastal, this species prefers sheltered environments although may also be recorded several kilometres from the sea in harbours, inlets and rivers. Nests in small colonies in low dunes or on sandy beaches just above the high tide mark near estuary mouths or adjacent to coastal lakes and islands. Often seen foraging in the shallow water of channels and estuaries and in the surf on beaches (OEH 2011b).	Not expected given absence of preferred habitat.	No
Stictonetta naevosa Freckled Duck	V	-	Y	-	Breeds in large temporary swamps in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers and other rivers within the Riverina. May also occur as far as coastal NSW during periods of extensive inland droughts. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds (OEH 2011b).	Not expected given absence of preferred habitat.	No
Tyto capensis Grass Owl	V	-	Y	-	Within NSW, this species is most likely to occur within the north-east of the state. Found in areas of tall grass, including grass tussocks, swamp areas, grassy plains, swampy heath and in cane	Not expected given the absence of preferred habitat.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
					grass or sedges on flood plains. Nests are found in trodden grass and often accessed by tunnels through vegetation (OEH 2011b).		
Tyto novaehollandiae **Masked Owl**	**V**	**-**	**Y**	**-**	**Records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner of the state. Lives in dry eucalypt forests and woodlands from sea level to 1100m. Often hunts along the edges of forests, including roadsides for tree and ground dwelling mammals. Roosts and breeds in moist eucalypt gullies, using large tree hollows or sometimes caves for nesting (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Xenus cinereus Terek Sandpiper	V	-	Y	-	Within NSW, the two main sites for this species are the Richmond River estuary and the Hunter River estuary. Recorded in coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs and occasionally up to 10km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species (OEH 2011b).	Not expected given the absence of preferred habitat.	No
MAMMALS							
Aepyprymnus rufescens Rufous Bettong	V	-	Y	-	Occurs in patchy distribution from Cooktown in Queensland to north eastern NSW, as far south as Mt Royal National Park. Inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter (OEH 2011b).	Not expected given development in immediate environs.	No
Chalinolobus dwyeri Large-eared Pied Bat	V	V	N	Y	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies (OEH 2011b).	Low likelihood of occurrence in remnant vegetation in road reserve. Not expected in development footprint.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Dasyurus maculatus Spotted-tailed Quoll	V	E	Y	Y	Found on the east coast of NSW and is recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites (OEH 2011b).	Not expected given development in immediate environs.	No
Falsistrellus tasmaniensis Eastern False Pipistrelle	V	-	Y	-	Found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy (OEH 2011b).	Moderate likelihood of occurrence in remnant vegetation in road reserve. Not expected in development footprint.	No
Miniopterus australis **Little Bentwing-bat**	**V**	**-**	**Y**	**-**	**Occurs in coastal north-eastern NSW in moist eucalypt forest, rainforest or dense coastal banksia scrub. Roosts in caves, tunnels and sometimes tree hollows (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Miniopterus schreibersii oceanensis **Eastern Bentwing-bat**	**V**	**-**	**Y**	**-**	**Occurs along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Mormopterus norfolkensis **Eastern Freetail-bat**	**V**	**-**	**Y**	**-**	**Found along the east coast from south Queensland to southern NSW in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Myotis macropus Southern Myotis	V	-	Y	-	Generally roost in groups of 10 to 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools (OEH 2011b).	Not expected given absence of preferred habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Petaurus australis Yellow-bellied Glider	V	-	Y	-	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Inhabits tall, mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation with mixed coastal forests to dry escarpment forests preferred in the north and moist coastal gullies and creek flats to tall montane forests preferred in the south. Very mobile species, occupying a large home range between 25-85ha and den in family groups in the hollows of large trees (OEH 2011b).	Not expected given development in immediate environs and the absence of preferred habitat elements.	No
Petaurus norfolcensis Squirrel Glider	V	-	Y	-	Widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or *Acacia* midstorey and requires abundant tree hollows for refuge and nest sites (OEH 2011b).	Moderate likelihood of occurrence in remnant vegetation in road reserve.	No
Petrogale penicillata Brush-tailed Rock-wallaby	E	V	N	Y	In NSW, occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees and shelters or basks during the day in rock crevices, caves and overhangs (OEH 2011b).	Not expected given absence of habitat elements.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Phascogale tapoatafa Brush-tailed Phascogale	V	-	Y	-	Within NSW, this species is mainly found east of the Great Dividing Range although a few records are also known to the west of the divide. Prefers dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter. Also known to inhabit heath, swamps, rainforest and wet sclerophyll forest. Prefer to forage in rough-barked trees of 25cm DBH or greater and nest and shelter in tree hollows with entrances 2.5-4cm wide (OEH 2011b).	Low to moderate likelihood of occurrence in vegetation within road reserve.	No
Phascolarctos cinereus **Koala**	**V**	**-**	**Y**	**-**	**In NSW, mainly occurs on the central and north coasts with some populations in the western region where it inhabits eucalypt woodlands and forests and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Planigale maculata Common Planigale	V	-	Y	-	Found in coastal north-eastern NSW, coastal eastern Queensland and Arnhem Land. The species reaches its southern distribution limit on the NSW lower North Coast. Inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover; usually close to water. Active at night, they shelter during the day in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks. Prey on insects and small vertebrates, some nearly their own size. The female builds a nest lined with grass, eucalypt leaves or shredded bark (OEH, 2011b).	Low to Moderate likelihood of occurrence in remnant vegetation in road reserve. Not expected in development footprint.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Potorous tridactylus Long-nosed Potoroo	V	V	N	Y	In NSW, generally restricted to coastal heaths and forests east of the Great Dividing Range with an annual rainfall exceeding 760mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature (OEH 2011b).	Low likelihood of occurrence in remnant vegetation in road reserve.	No
Pseudomys gracilicaudatus Eastern Chestnut Mouse	V	-	Y	-	Within NSW, mainly found along the coast and eastern fall of the Great Dividing Range, north from the Hawkesbury River to Queensland. Isolated records also known from Jervis Bay. Inhabits heathland and is most commonly found in dense, wet heath and swamps in NSW. Optimal habitat appears to be vigorously regenerating heathland that has been burnt in the last 18 months to four years (OEH 2011b).	Not expected given the absence of habitat elements.	No
Pseudomys novaehollandiae New Holland Mouse	-	V	N	Y	Within NSW, this species is found along the coast in dry heath and open forest. Patchy distribution of this species is most likely attributed to a preference for soft substrates (eg sand), a heath-type layer of leguminous perennials less than 1m tall and sparse ground cover and litter. Such characteristics are generally associated with a habitat in the early and middle stages of regeneration following disturbances including fire and sandminig (Strahan 2004).	Not expected given the absence of preferred habitat.	No

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Pteropus poliocephalus **Grey-headed Flying-fox**	**V**	**V**	**Y**	**Y**	**Found within 200km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feed on the nectar and pollen of native trees, in particular *Eucalyptus* spp., *Melaleuca* spp. and *Banksia* spp., and fruits of rainforest trees and vines (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V	-	Y	-	Within NSW, scattered records are known from the New England Tablelands and North West Slopes. Roosts within tree hollows and buildings and are also known to use mammal burrows in treeless areas. Forages in most habitats across its very wide range, with and without trees (OEH 2011b).	Low likelihood of occurrence given outside of known distribution area.	No
Scoteanax rueppellii **Greater Broad-nosed Bat**	**V**	**-**	**Y**	**-**	**In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3-6m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects (OEH 2011b).**	**High – recorded during field investigations.**	**Yes**

Scientific Name Common Name	Legal Status TSC Act	 EPBC Act	Recorded in Locality	Predicted to Occur in Locality	Habitat Requirements	Likelihood of Occurrence	Assessment Required
Syconycteris australis Common Blossom-bat	V	-	Y	-	Inhabits coastal areas of eastern Australia from Hawks Nest in NSW to the Cape York Peninsula in Queensland. Roost in dense foliage and vine thickets within the sub-canopy of littoral rainforest and forage within adjacent heathland and paperbark swamp. Also recorded within a range of subtropical forest types, rainforest, wet sclerophyll forest and coastal eucalypt forest (OEH 2011b).	Low likelihood of occurrence given absence of suitable roosting habitat and preferred foraging resources.	No

V = Vulnerable; E = Endangered; CE = Critically Endangered; PE = Presumed Extinct; PD = Preliminary Determination.

Note: Fish and marine birds and mammals were excluded from the assessment. Predicted to occur in locality is based on species being identified in the online DSEWPC protected matters search.

Annex C

Environment Protection and Biodiversity Conservation Act 1999 Assessment

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and cultural places. Under the EPBC Act, an assessment and approvals process has been developed for actions that significantly impact Matters of National Environmental Significance (MNES) as listed under the Act.

Assessment of the potential for the proposed action to impact upon threatened species listed under the EPBC Act was undertaken in accordance with *EPBC Act Policy Statement 1.1: Significant Impact Guidelines* (DEH 2006) (refer below).

Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox is listed as Vulnerable under the EPBC Act. This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH 2011b). Roosting camps are generally located within 20km of a regular food source (generally pollen and nectar from native trees and fruits of rainforest trees and vines) and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH 2011b).

A number of Grey-headed Flying-foxes were observed foraging on flowering Blackbutts within the PMBH site and immediate environs during field investigations. A number of previous observations have also been recorded within close proximity to the site (OEH 20011a). Suitable roosting habitat for the Grey-headed Flying-fox was not identified within the site.

(a)	*Is the action likely to lead to a long-term decrease in the size of an important population of a species?*

The Grey-headed Flying-fox generally exhibits a high fidelity to traditional camp sites for breeding and rearing of young while tending to forage opportunistically over a wide range. Accordingly they are sensitive to the loss of traditional roosting camp sites.

The redevelopment of the PMBH would require the removal of approximately 62 planted and 21 remnant mature eucalypt trees and 0.1ha of planted rainforest species which provide foraging habitat for the Grey-headed Flying-fox. Suitable roosting habitat for the Grey-headed Flying-fox was not identified within the site although this species was observed as an overfly species during spotlighting activities and was also observed foraging amongst flowering Blackbutts, both on-site and directly to the west of the proposed development footprint.

The majority of observations were recorded to the west of the proposed development footprint, within the Blackbutt Tall Open Forest community that occupies the Oxley Highway road reserve, due to an abundance of flowering Blackbutts. Although fewer Grey-headed Flying-foxes were observed within the development footprint due to the reduced abundance of Blackbutt species, it is recognised that the eucalypt and rainforest species within the proposed footprint also provide foraging habitat at other times of the year during appropriate flowering periods.

The closest identified camp site for the Grey-headed Flying-fox is located approximately 4km to the north east of the site, within the Kooloonbung Creek Nature Reserve. The nearest significant foraging habitat for this species occurs within the Lake Innes Nature Reserve, located approximately 0.5km to the east of the site.

Although the proposal would result in the removal of foraging habitat for the Grey-headed Flying-fox, it is not expected to lead to a long-term decrease in the size of an important population given the prevalence of similar vegetation in the locality, including the presence of higher quality foraging habitat surrounding Lake Innes Nature Reserve.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

(b) Is the action likely to reduce the area of occupancy of an important population?

Suitable roosting habitat was not identified within the site although this species was observed foraging on flowering Blackbutts during field investigations. Given that the Grey-headed Flying-fox is a highly mobile species which tends to forage opportunistically over a wide range, it is considered that the removal of foraging habitat as a result of the proposal will not lead to a significant reduction in the occupancy of an important population of this species.

(c) Is the action likely to fragment an existing important population into two or more populations?

Foraging habitat for the Grey-headed Flying-fox that is to be removed as a result of the proposal, is located directly to the east and north east of the existing PMBH building and associated infrastructure, in partially cleared areas associated with the construction and maintenance of the Facility. The removal of vegetation within the proposed development footprint is unlikely to result in the fragmentation of populations of this highly mobile species.

(d) Is the action likely to adversely affect habitat critical to the survival of the species?

No areas of critical habitat have been identified for the Grey-headed Flying-fox.

(e) Is the action likely to disrupt the breeding cycle of an important population?

No roosting and/or breeding sites for the Grey-headed Flying-fox were identified within the site. Although the proposal would result in the removal of foraging habitat for the Grey-headed Flying-fox, it is not expected to have an adverse effect on the breeding cycle of the species, particularly given the prevalence of similar vegetation in the locality, including the presence of higher quality foraging habitat surrounding Lake Innes Nature Reserve.

(f) Is the action likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Vegetation within the site identified as providing potential foraging habitat for the Grey-headed Flying-fox is considered to be locally abundant and not of significant importance to the long-term survival of the species. Consequently, the proposal is not considered likely to adversely affect the availability or quality of habitat for the Grey-headed Flying-fox to the extent that the species is likely to decline.

(g) Is the action likely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Vegetation removal and ground disturbance associated with proposal has the potential to introduce and distribute exotic plant species, in particular invasive climbers that may impact on habitat availability in the long term. Measures to control invasive weed species during and following construction will be included in the Environmental Management Plan (EMP) for the proposal. With the adoption of appropriate mitigation measures, it is considered unlikely that the proposal will result in the establishment of invasive species considered harmful to areas of potential habitat for the Grey-headed Flying-fox.

(h) Is the action likely to introduce disease that may cause the species to decline?

The proposed action is not considered likely to introduce disease that may cause the Grey-headed Flying-fox species to decline.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

(i)	*Is the action likely to interfere substantially with the recovery of the species?*

A draft recovery plan has been prepared for the Grey-headed Flying-fox (DECCW, 2009). The overall objectives of the recovery plan are::

- to reduce the impact of threatening processes and arrest decline throughout the species' range;
- to conserve the functional roles of the species in seed dispersal and pollination; and
- to improve the standard of information available to guide recovery in order to increase community knowledge and reduce the impacts of negative public attitudes towards the species.

The proposal incorporating mitigation measures is unlikely to contravene these strategies or interfere substantially with the recovery of the Grey-headed Flying-fox.

Conclusion

Based on the above assessment, it is considered unlikely that the proposed action will have a significant impact upon the Grey-headed Flying-fox.

Annex D

Threatened Species Conservation Act 1995 Assessment

Developments requiring approval from a statutory authority of the NSW State Government are required to be assessed in accordance with Section 5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), as amended by the NSW *Threatened Species Conservation Act 1995* (TSC Act). Section 5A sets out seven factors that need to be considered in determining whether a proposed action will, or is likely to, have a significant impact on a threatened species, endangered population or an endangered ecological community listed under the schedules of the TSC Act or the NSW *Fisheries Management Act 1994* (FM Act). If a significant impact is considered likely, the proposed action may require consent from the Director General of the NSW Department of Environment, Climate Change and Water (DECCW) and the preparation of a Species Impact Statement (SIS).

Masked Owl (*Tyto novaehollandiae***)**

The Masked Owl is listed as Vulnerable under the TSC Act. This species inhabits dry eucalypt forest and woodlands from sea level to 1100m (OEH 2011b). It roosts and breeds in moist eucalypt forests and gullies, using large tree hollows or sometimes caves for nesting, although is often observed hunting along the edges of forests, including roadsides (OEH 2011b). Pairs have a large home range of 500 to 1000ha (OEH 2011b).

The Masked Owl was observed during one of the spotlighting evenings on the western edge of the PMBH site (refer *Figure 4.1*). It is likely that the site provides a suitable hunting ground for this species although suitable breeding and roosting habitat is considered unlikely due to the absence of suitable tree hollows from the site and close proximity to disturbances associated with the Oxley Highway, Hospital and nearby residential and industrial areas.

(a)	*in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*
	Suitable roosting or breeding habitat for the Masked Owl was not identified within the PMBH site, although the site is considered to provide a suitable hunting ground for this species. The removal of approximately 62 planted and 21 mature remnant eucalypt trees and 0.1ha of planted rainforest species within the proposed development footprint would result in the loss of habitat for prey species, primarily the Common Ringtail Possum, although is not considered to have a significant impact such that life cycle of prey species, and subsequently the Masked Owl, would be placed at risk of extinction.
(b)	*in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*
	Not applicable.
(c)	*in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
	Not applicable.
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
	Not applicable.
(d)	*in relation to the habitat of a threatened species, population or ecological community:*
	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Masked Owl (*Tyto novaehollandiae***)**

Suitable roosting or breeding habitat for the Masked Owl was not identified within the PMBH site although the site is considered to provide a suitable hunting ground for this species. The proposal would result in the removal of approximately 62 planted and 21 remnant mature eucalypt trees and 0.1ha of planted rainforest species that provides habitat for prey species, including the Common Ringtail Possum.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The Masked Owl is a highly mobile species that occupies a large home range of 500-1000ha. Given the absence of suitable roosting or breeding habitat from the PMBH site, it is likely that the Masked Owl frequents the PMBH as a hunting resource. Although typically a forest owl, this species is known to hunt within partially cleared areas and along roadsides similar to the Oxley Highway road reserve. The removal of vegetation within the proposed development footprint will not result in the fragmentation or isolation of vegetation within the Oxley Highway road reserve which provides a potential hunting resource for the Masked Owl.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Although roosting or breeding habitat for the Masked Owl is not being removed as a result of the proposal, it is recognised that sheltering and breeding habitat for prey species (primarily the Common Ringtail Possum) would be impacted. Impacts to prey species are considered to be short-term and unlikely to have a significant impact on the diet or hunting habits of the Masked Owl such that the long-term survival of the species within the locality would be affected.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

The Masked Owl is not currently eligible for declaration of Critical Habitat as it is not listed as Endangered under Schedule 1 of the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan has been prepared for Large Forest Owls: Powerful Owl, Sooty Owl and Masked Owl (DEC 2006). The objectives of this plan are to:

- assess the area and distribution of high quality habitat for each owl species across private and public land;
- monitor trends in population parameters for each owl species and across different land tenures and disturbance histories;
- assess implementation and effectiveness of forest management prescriptions designed to mitigate the impact of timber-harvesting operations on owl species;
- ensure adequate assessment of impacts on large forest owls during the planning and environmental assessment process;
- protection and management of significant owl habitat;
- improved understanding of the biology and ecology of forest owls;
- increase community awareness and involvement in owl conservation; and
- co-ordinate implementation of the recovery plan (DEC 2006).

The proposed action incorporating mitigation measures is unlikely to contravene these strategies or interfere substantially with the recovery of the Masked Owl.

Masked Owl (*Tyto novaehollandiae*)

(g)	*whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*
	The clearing of native vegetation is listed as a key threatening process under the TSC Act. With the adoption of mitigation measures (refer *Section 7*) including avoiding and/or minimising clearance of native vegetation where possible, it is not expected that the proposed activity will result in a significant increase of this key threatening process.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox is listed as Vulnerable under the TSC Act. This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH 20011b). Roosting camps are generally located within 20km of a regular food source (generally pollen and nectar from native trees and fruits of rainforest trees and vines) and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH 20011b).

A number of Grey-headed Flying-foxes were observed foraging on flowering Blackbutts within the PMBH site and immediate environs during field investigations. A number of previous observations have also been recorded within close proximity to the site (OEH, 20011a). Suitable roosting habitat for the Grey-headed Flying-fox was not identified within the site.

(a)	*in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*
	The Grey-headed Flying-fox generally exhibits a high fidelity to traditional camp sites for breeding and rearing of young while tending to forage opportunistically over a wide range. Accordingly they are sensitive to the loss of traditional roosting camp sites. The redevelopment of the PMBH would require the removal of approximately 62 planted and 21 remnant mature eucalypt trees and 0.1ha of planted rainforest species which provide foraging habitat for the Grey-headed Flying-fox. Suitable roosting habitat for the Grey-headed Flying-fox was not identified within the site although this species was observed as an overfly species during spotlighting activities and was also observed foraging amongst flowering Blackbutts, both on-site and directly to the west of the proposed development footprint. The majority of observations were recorded to the west of the proposed development footprint, within the Blackbutt Tall Open Forest community that occupies the Oxley Highway road reserve, due to an abundance of flowering Blackbutts. Although fewer Grey-headed Flying-foxes were observed within the development footprint due to the reduced abundance of Blackbutt species, it is recognised that the eucalypt and rainforest species within the proposed footprint also provide foraging habitat at other times of the year during appropriate flowering periods. The closest identified camp site for the Grey-headed Flying-fox is located approximately 4km to the north east of the site, within the Kooloonbung Creek Nature Reserve. The nearest significant foraging habitat for this species occurs within the Lake Innes Nature Reserve, located approximately 0.5km to the east of the site. Although the proposal would result in the removal of foraging habitat for the Grey-headed Flying-fox, it is not expected to have an adverse effect on the life cycle of the species such that a viable population would be placed at risk of extinction given the prevalence of similar vegetation in the locality, including the presence of higher quality foraging habitat surrounding Lake Innes Nature Reserve.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

(b)	*in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*
	Not applicable.
(c)	*in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
	Not applicable.
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
	Not applicable.
(d)	*in relation to the habitat of a threatened species, population or ecological community:*
	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
	The proposal would require the removal of approximately 62 planted and 21 remnant mature eucalypt trees and 0.1ha of planted rainforest species which provide foraging habitat for the Grey-headed Flying-fox. Suitable roosting habitat for this species was not identified within the site.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
	Foraging habitat for the Grey-headed Flying-fox that is to be removed as a result of the proposal, is located directly to the east and north east of the existing PMBH building and associated infrastructure in partially cleared areas associated with the construction and maintenance of the Facility. The removal of vegetation within the proposed development footprint is unlikely to result in the fragmentation or isolation of other areas of foraging habitat for this highly mobile species.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,
	Vegetation within the proposed development footprint identified as providing foraging habitat for the Grey-headed Flying-fox is considered to be locally abundant and not of significant importance to the long-term survival of the species within the locality.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	No areas of critical habitat have been identified for the Grey-headed Flying-fox.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	A draft recovery plan has been prepared for the Grey-headed Flying-fox (DECCW, 2009). The overall objectives of the recovery plan are:: • to reduce the impact of threatening processes and arrest decline throughout the species' range; • to conserve the functional roles of the species in seed dispersal and pollination; and • to improve the standard of information available to guide recovery in order to increase community knowledge and reduce the impacts of negative public

Grey-headed Flying-fox (*Pteropus poliocephalus*)

attitudes towards the species.

The proposal incorporating mitigation measures is unlikely to contravene these strategies or interfere substantially with the recovery of the Grey-headed Flying-fox.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The clearing of native vegetation is listed as a key threatening process under the TSC Act. With the adoption of mitigation measures (refer *Section 7*) including avoiding and/or minimising clearance of native vegetation where possible, it is not expected that the proposed activity will result in a significant increase of this key threatening process.

Koala (*Phascolarctos cinereus*)

The Koala is listed as Vulnerable under the TSC Act. This species inhabits eucalypt woodlands and forests and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 20011b).

Two Koalas were observed within the immediate vicinity of the proposed development footprint during spotlighting activities and evidence of Koala habitation (scats and scratches on tree trunks) was also identified. Previous assessments (ERM 2010 & 2011) also indicate that the PMBH grounds and surrounding vegetation support a resident population of Koalas with high activity recorded throughout the area, including sighting of an adult and juvenile that would indicate a viable population.

A number of Koala feed trees as listed under State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) and the Port Macquarie-Hastings Development Control Plan 2011 (Port Macquarie-Hastings DCP), were also recorded within the PMBH site and immediate environs, including the proposed development footprint.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposed redevelopment would require the removal of approximately 62 planted and 21 remnant mature eucalypt trees, many of which are recognised as Koala feed trees under SEPP 44 and the Port Macquarie-Hastings DCP. Koala feed trees identified included Tallowwood (*Eucalyptus microcorys*), Forest Red Gum (*Eucalyptus tereticornis*), Swamp Mahogany (*Eucalyptus robusta*) and Blackbutt (*Eucalyptus pilularis*).

The dominant Koala feed tree within the planted area was Tallowwood, followed by Forest Red Gum. The majority of these trees ranged in height from 8-18m and 15-40cm DBH. They were planted in 1994 as part of the PMBH "Rainforest Amenity Area".

The dominant Koala feed tree within the south western corner of the proposed development footprint was Blackbutt. Trees at this location were up to 30m in height and 110cm DBH and are considered to be remnants of the Blackbutt Tall Open Forest community that would have once occupied this location.

Two Koalas were observed during the field investigations, one (a male) within a large Tallowwood located in the south western corner of the proposed development footprint and the other (likely a female) in a Forest Red Gum on the western edge of the footprint (refer *Figure 4.1*). The large Tallowwood will be retained and protected as part of the proposal although the Forest Red Gum occurs on the western site boundary and will be removed to accommodate a bushfire asset protection zone associated with the redevelopment.

Many other Koala feed trees within the proposed development footprint also showed

evidence (scats and scratches) of Koala activity. Additionally, previous Koala records within the PMBH site (ERM 2010) and immediate environs (refer *Table 5.1*) indicate a high level of Koala activity and the presence of a breeding population.

A small area of remnant vegetation in the south east corner of the PMBH site is identified as "Koala Habitat" under the Port Macquarie-Hastings Local Environmental Plan 2011 (Port Macquarie-Hastings LEP). A review of aerial photography indicates that this area is connected (to the south east) through a series of narrow corridors to the Lake Innes Nature Reserve, which is known to support a healthy population of approximately 600 Koalas (NPWS 1999). The area identified as "Koala Habitat" within the PMBH site will not be impacted as a result of the proposal.

The Koala species is threatened by the loss, modification and fragmentation of habitat (OEH 20011b). The proposal would result in the removal of approximately 83 eucalypt trees, many of which are currently utililised as a foraging and sheltering resource for a viable local Koala population. Consequently, it is considered that the proposal would result in a significant loss of foraging habitat for this species although given the availability of alternative foraging resources in the local area (eg Lake Innes Nature Reserve), is not expected to have a significant impact on the life cycle of the Koala to the extent that it would be placed at risk of extinction. Regardless, planting of Koala feed trees within a suitable location at a minimum ratio of 2:1 is considered necessary to offset impacts associated with the proposal in the long-term.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Not applicable.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Approximately 83 eucalypt trees (62 planted and 21 remnant) would be removed to accommodate the proposed redevelopment and associated bushfire asset protection zone. Many of these trees are recognised Koala feed trees and provide a foraging resource for a local viable Koala population.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

A review of aerial photographs indicates that landscaping and retained trees within the PMBH grounds and remnant vegetation in the adjoining Oxley Highway road reserve and along the southern boundary of the site, are connected through a series of narrow corridors to the Lake Innes Nature Reserve in the south east. The removal of planted and retained eucalypts as a result of the proposal is not expected to break this link or isolate areas of habitat although it is considered likely that the removal of remnant eucalypts in the south western corner of the PMBH site may reduce connectivity to some

extent.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Approximately 83 eucalypt trees will be removed as a result of the proposal, comprising approximately 62 planted eucalypt trees and 21 mature remnant trees. Many of these trees are recognised as Koala feed trees under SEPP 44 and the Port Macquarie-Hastings Council DCP and are known to provide a foraging resource for a local viable Koala population. The majority of planted trees range in height from 8-18m and 15-40cm DBH whereas mature remnant trees within the south western corner of the PMBH site were up to 30m in height and 110cm DBH. These trees are considered to be an important foraging resource for a local Koala population. However, with the adoption of a satisfactory offset planting program, the removal of these trees is not considered to significantly impact the long-term survival of this species in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat have been identified for the Koala.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A draft recovery plan has been prepared for the Koala (NPWS, 2003). The objectives of this plan are to:

- conserve Koalas in their existing habitat;
- rehabilitate and restore Koala habitat and populations;
- develop a better understanding of the conservation biology of Koalas;
- increase community awareness and education regarding the distribution, conservation and management of Koalas at a national, state and local scale;
- manage captive, sick, injured or orphaned Koalas;
- manage over-browsing to prevent Koala starvation and ecosystem damage; and
- co-ordinate implementation of recovery planning (NPWS 2003).

The proposal would result in the removal of approximately 83 eucalypt trees, many of which are known to provide a foraging resource for a local viable Koala population. Consequently, it is considered necessary that planting of Koala feed trees is implemented at a minimum ratio of 2:1 to offset impact associated with the proposal in the long-term.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The clearing of native vegetation is listed as a key threatening process under the TSC Act. With the adoption of mitigation measures (refer *Section 7*) including avoiding and/or minimising clearance of native vegetation where possible, it is not expected that the proposed activity will result in a significant increase of this key threatening process.

Microchiropteran Bat Species

Five vulnerably listed (TSC Act) microchiropteran bat species were recorded within the PMBH site and immediate environs during field investigations. These microchiropteran bat species generally hunt within or on the edge of vegetation, along watercourses and other linear cleared areas for flying insects and roost in caves, tree hollows, mines, old buildings, stormwater tunnels and other man-made structures depending on the species.

A brief description of the requirements for each of the five species is provided below:

Little Bentwing-bat (*Miniopterus australis*)

This species is generally found within well timbered areas in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub (OEH 2011b). It is known to roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day and forage beneath the canopy of densely vegetated habitats during the night (OEH 2011b).

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

This species hunts in forested areas, catching moths and other flying insects above the tree tops (OEH 2011b). Caves are the primary roosting habitat although derelict mines, storwater tunnels, buildings and other man-made structures may also be used (OEH 2011b). Relies on a maternity cave for the birth and rearing of its young (OEH 2011b).

Eastern Freetail-bat (*Mormopterus norfolkensis*)

This species occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range and roosts mainly in tree hollows although is also known to roost under bark or in man-made structures (OEH 2011b).

Hoary Wattled Bat (*Chalinolobus nigrogriseus*)

This species is known to occur in dry open eucalypt forests, favouring forests dominated by Spotted Gum (*Corymbia maculata*), boxes and ironbarks and heathy coastal forests where Red Bloodwood (*Corymbia gummifera*) and Scribbly Gum (*Eucalyptus haemastoma*) are common (OEH 2011b). Forests with a naturally sparse understorey tend to provide more suitable habitat (OEH 2011b).

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

This species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest although is most commonly found in tall wet forest (OEH 2011b). Generally roosts in tree hollows although has also been found in buildings (OEH 2011b).

(a)	*in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*
	Linear clearings within and adjacent to the proposed development footprint potentially provide flyways (hunting areas) for microchiropteran bat species including the existing powerline easement, foot path and a clearing above a water main to the west of the PMBH site. Small tree hollows within the Blackbutt Tall Open Forest community and possibly mature trees in the south western corner of the proposed development footprint potentially provide roosting habitat for hollow-dependent bat species. Within the proposed development footprint, roosting habitat for hollow-dependant bat species would be restricted to large remnant eucalypts in the south eastern corner that potentially provide small hollows. Although no hollows were observed during the assessment, it is possible that some small hollows are present within the upper branches

Microchiropteran Bat Species

of large remnant trees.

Threatened bat species recorded during the field investigations and known to utililse tree hollows for roosting habitat are the Little Bentwing-bat Bat, Eastern Freetail-bat and Greater Broad-nosed Bat. Due to the absence of caves or other preferred structures, it is considered unlikely that the site provides suitable roosting habitat for the Eastern Bentwing-bat.

The Hoary Wattled Bat was not identified in threatened species searches and is outside of its known distribution range (north of Coffs Harbour). Furthermore, preferred habitat for this species does not occur within the PMBH site. As the certainty of identification for this species was Possible (as opposed to Confident or Probable) it is likely that data was not clear enough for accurate identification.

Vegetation removal is not considered to have a significant impact on the foraging behaviour of microchiropteran bat species as they tend use flyways, predominantly located to the west of the PMBH site, as hunting grounds.

With the adoption of appropriate mitigation measures including the presence of an ecologist during vegetation removal to inspect potential tree hollows, the proposal is not considered on the life cycle of microchiropteran bat species such that they would be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Not applicable.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposal would require the removal of approximately 21 mature remnant eucalypts from the south eastern corner of the proposed development footprint. Although none were observed during field investigations, these trees potentially provide small hollows suitable for roosting of hollow-dependant microchiropteran bat species.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

No areas of known habitat for microchiropteran species are likely to become fragmented or isolated as a result of the proposed redevelopment.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Microchiropteran Bat Species

	With the adoption of appropriate mitigation measures, the removal of vegetation is considered unlikely to have a significant impact on the long-term survival of microchiropteran bat species within the locality.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	No areas of critical habitat have been identified for the aforementioned microchiropteran bat species.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	A recovery plan has not been prepared for the aforementioned microchiropteran bat species, however, the NSW OEH has identified the following common priority actions for the recovery of these species: • control foxes and feral cats near roost sites and maternity caves; • retain native vegetation around roost sites; • minimise pesticide use in foraging areas; • protect roosting sites from damage or disturbance; and • exclude fire from known roosting areas (OEH 20011b). The proposal incorporating mitigation measures is unlikely to contravene these strategies or interfere substantially with the recovery of microchiropteran bat species.
(g)	*whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*
	The clearing of native vegetation is listed as a key threatening process under the TSC Act. With the adoption of mitigation measures (refer *Section 7*) including avoiding and/or minimising clearance of native vegetation where, it is not expected that the proposed activity will result in a significant increase of this key threatening process.

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