Annex H

Lismore to Mullumbimby Electricity Network Upgrade - Ecological Assessment
(ERM, 2008)

FINAL REPORT

Country Energy

Lismore to Mullumbimby Electricity Network Upgrade *Ecological Assessment*

October 2008

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FINAL REPORT

Country Energy

Lismore to Mullumbimby Electricity Network Upgrade *Ecological Assessment*

October 2008

Reference: 0051706_Ecology_FINAL

For and on behalf of:
Environmental Resources Management Australia

Approved by: Murray Curtis

Signed:

Position: Partner

Date: 21 October 2008

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1 INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Country Energy to conduct an ecological assessment of land (herein referred to as 'the Project Area') associated with the proposed Lismore to Mullumbimby electricity network upgrade (refer *Figure 1.1*).

ERM completed a Line Route Selection (LRS) Report (2008a) for the proposal which identified areas of potential ecological constraints and was based on desktop research and preliminary field investigations.

This report presents the results of further ecological assessment undertaken by ERM and assesses the potential ecological impacts resulting from the proposed network upgrade with particular focus given to those areas previously identified as potential ecological constraints. This report has been prepared in accordance with the Director Generals Requirements issued pursuant to Section 75F of the *Environmental Planning and Assessment Act* 1979 (*EP&A Act*)and is designed to be read in conjunction with the Environmental Assessment Report (EAR) (ERM, 2008b) that has been prepared under Part 3A of the *EP&A Act* for the proposal.

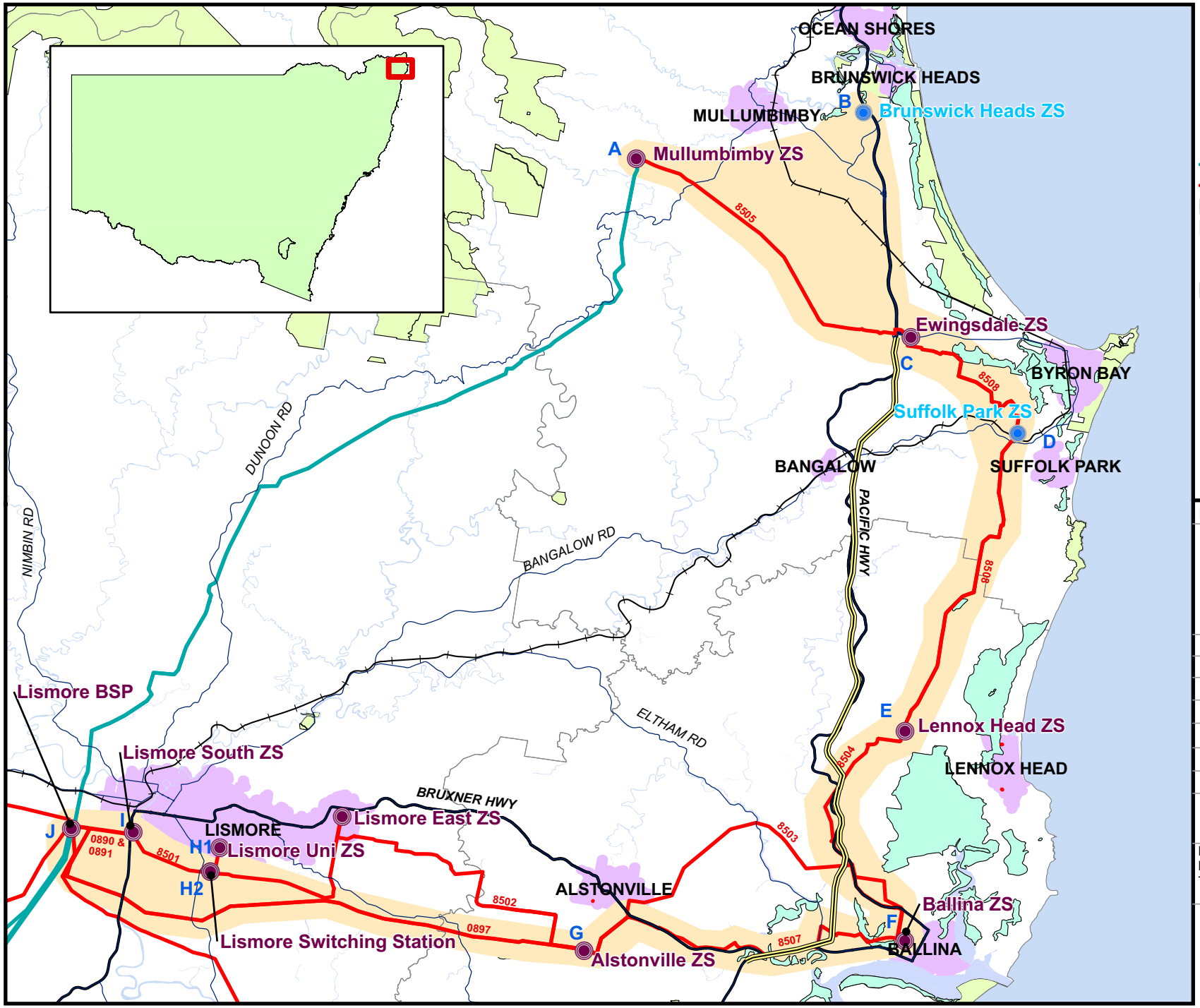
Detailed ecological assessment has not been conducted for the proposed Suffolk Park and Brunswick Heads substations sites, the Brunswick Head Feeder Loop and any deviations or new lines in the Alstonville to Lismore section of the Project Area. These areas are identified as potential ecological 'hotspots' and detailed ecological assessment of these areas will be conducted prior to application for their Project Approval.

1.1 AIMS AND OBJECTIVES

The aim of this study was to assess the ecology of the Project Area and estimate the potential ecological 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 Project Area and describe them in a broader environmental context;
- assess the potential of the Project Area to significantly contribute to the conservation value of the surrounding area;
- assess the potential for threatened species, populations or ecological communities as listed under relevant legislation to occur within the Project Area;
- identify and assess the potential impacts resulting from the proposed works on threatened species, populations, ecological communities or their habitats; and
- identify mitigation measures to reduce any potential impacts identified.


OCEAN SHORES
BRUNSWICK HEADS
MULLUMBIMBY
B
Brunswick Heads ZS
A
Mullumbimby ZS
8505
Ewingsdale ZS
C
BYRON BAY
8508
Suffolk Park ZS
D
SUFFOLK PARK
BANGALOW
PACIFIC HWY
DUNOON RD
NIMBIN RD
BANGALOW RD
ELTHAM RD
Lismore BSP
Lismore South ZS
BRUXNER HWY
LISMORE
Lismore East ZS
J
I
H1
Lismore Uni ZS
H2
0890 &
0891
8501
8502
0897
Lismore Switching Station
ALSTONVILLE
G
Alstonville ZS
8503
E
Lennox Head ZS
8504
LENNOX HEAD
F
Ballina ZS
8507
BALLINA
Legend
Existing Substation
Proposed Substation
Pacific Highway Upgrade
Casino-Murwillumbah Railway
Main Roads
Highway
Existing 132kV
Existing 66kV
SEPP14 Areas
LGA boundaries
Project Area
Built-up Areas
National Parks
Figure 1.1
Project Area
Client: Country Energy
Project: Lismore to Mullumbimby Upgrade
Drawing No: 0051706_01
Suffix No: A0
Date: 29/07/08
Drawing size: A4
Drawn by: TH
Reviewed by: WW
Source: Department of Lands
Scale: Refer Scale Bar
N
0 1 2 4 6 8 km
Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888
ERM

2 PROJECT AREA DESCRIPTION

2.1 LOCATION

The Project Area of the proposed electricity network upgrade is located within the Far North Coast of NSW within the Lismore City Council, Ballina Shire Council and Byron Shire Council Local Government Areas (LGAs). The proposed electricity network upgrade covers a distance of approximately 110 kilometres (km) from Lismore to Mullumbimby via the localities of Alstonville, Ballina, Lennox Head, Suffolk Park, Ewingsdale and Brunswick Heads (refer *Figure 1.1*).

2.2 LAND USE

The Project Area includes extensive areas of cleared agricultural land, residential and rural residential areas as well as potential future residential areas.

Remnants of native eucalypt woodlands, forests and rainforests are scattered throughout the site in a highly fragmented nature. Wetland, riparian and coastal environments occur in the Project Area that are protected under State Environmental Planning Policies (SEPPs) No. 14, 44 and 71 respectively.

2.3 TOPOGRAPHY AND DRAINAGE

The general topography of the Project Area varies from gently rolling hills in the Hinterland areas to swamp, riverine and estuarine environments closer to the coast. The elevation of the Project Area ascends from the coastal floodplains to an elevation of 1157 metres (m) above sea level at Mount Warning. Higher order streams that run through the Project Area include Wilsons River and Emigrant Creek. Tributaries of these waterways and many lower order streams also run through the Project Area towards larger rivers (e.g. Richmond River and Brunswick River) and the coast.

2.4 CLIMATE

The climate of the Project Area is generally subtropical with a high rainfall during summer with dry winter and spring seasons (BSC, 1999).

2.5 GEOLOGY AND SOIL

The Mullumbimby area features Cainozoic quaternary river gravels, alluvium, sand and clay as well as Lismore basalt (including agglomerate and bole) and Palaeozoic Silurian greywacke and slate phyllite quartzite of the Neranleigh-Fernvale Group. The dominant geological characters south of Mullumbimby to Ewingsdale include tertiary Lamington volcanics including Lismore basalt and Nimbin rhyolite (rhyolite, obsidian pitchstone tuff and agglomerate). The Byron Bay and Suffolk Park areas are distinctive from the

remainder of the Project Area and feature Mesozoic Triassic-Jurassic sandstones, siltstones, claystones and conglomerates of the Bundamba Group. Between Ballina and Lismore the geology ranges from the coastal quaternary river gravels, alluvium, sand and clay, the Silurian Naranleigh-Fernvale Group and Lismore Basalt.

Soil characteristics vary throughout the Project Area as the landscape extends from the coastal flats and swamps to the hinterlands. Soils of the basaltic plateaus and undulating hills and valleys typically include acidic Krasnozems and brownish-red Krasnozems. Yellow podzolic soils are present, formed through the weathering of Nimbin rhyolite. Alluvial soils border the larger watercourses and are variable in composition, reflecting the geology. Soils vary from sandy loams derived from sedimentary parent material to deep loams derived from basalt. Basaltic alluvium is most prevalent and consists of brown clay loams. Soils on the coastal lowland plains are generally characterised as Aeolian and heath soils. Podzolic soils typically form on older sedimentary outcrops where there is vegetation cover in this region. In swampland areas, waterlogged peat soils border Aeolian deposits. Soils in these areas are generally composed of dark organic matter.

3 PROJECT OVERVIEW

Country Energy is specifically seeking Concept Approval for:

1. Upgrade, including any necessary realignments or deviations of transmission lines:

    a. Mullumbimby to Ballina - 66kV power line from the Mullumbimby substation to the Ballina substation, to 132 kV; and

    b. Ballina to Alstonville - 66kV power line from the Ballina substation to join to the new 132kV Lismore/Alstonville transmission line, to 132kV.

2. Construction of new transmission lines:

    a. Brunswick Heads feeder loop - 132kV transmission line from the Mullumbimby to Ewingsdale transmission line to the Brunswick Heads substation;

    b. Lismore to Alstonville - 132kV transmission line from the Lismore 132kV bulk supply point substation to join to the upgraded Alstonville to Ballina 132kV transmission line near Alstonville;

    c. 66kV power line from Lismore South 66/11kV substation to the Lismore 66kV switching station; and

    d. two underground 66kV power lines from Lismore bulk supply point substation to Lismore South substation.

3. Construction of new substations:

    a. 132/11kV substation at Brunswick Heads (the Brunswick Heads substation); and

    b. 132/11kV substation at Suffolk Park (the Suffolk Park substation).

4. Upgrade of substations:

    a. Mullumbimby 132/66/11kV substation (Mullumbimby substation) to 132/11kV;

    b. Ewingsdale 66/11kV substation (Ewingsdale substation) to 132/11kV;

    c. Lennox Head 66/11kV substation (Lennox Head substation) to 132/11kV;

    d. Ballina 66/11kV substation (Ballina substation) to 132/66/11kV;

    e. Lismore 132/66/11kV bulk supply point (Lismore substation); and

    f. Lismore South 66/11kV substation (Lismore South substation).

Country Energy is seeking Concept Approval for the Project and concurrently seeking Project Approval for Phase 1 of the project which is likely to include the following specific tasks from those listed above:

- *1. a and b;*
- *2. b and d; and*
- *4. a, b, c, d and e.*

4 RELEVANT LEGISLATION

When determining the potential impacts of a proposal on native flora and fauna, a number of legislative requirements must be considered. These are briefly discussed below.

4.1 COMMONWEALTH

4.1.1 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 Project Area and the proposed works are addressed in *Table 4.1*.

Table 4.1 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 locality.	Not Applicable
National Heritage Places	Not identified within the locality.	Not Applicable
Wetlands of International Significance (Ramsar)	Not identified within the locality.	Not Applicable
Commonwealth Marine Areas	A Commonwealth Marine Area has been identified within the locality however, the Project Area itself does not occur within a Commonwealth Marine Area.	Not Applicable
Threatened Ecological Communities	Not identified within the locality.	Not Applicable
Threatened Species	Threatened species were identified as potentially occurring within the locality.	*Section 6.3, Section 7.4 and Annex B*
Migratory Species	Migratory species were identified as potentially occurring within the locality.	*Section 7.4*

The proposed works are not expected to impact on any MNES (refer *Section 7.4*) and therefore the proposal does not require Commonwealth approval under the provisions of the *EPBC Act*.

4.2 STATE

4.2.1 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 (DoP).

Implications for the Proposal

The *EP&A Act* was amended in 2005 to include Part 3A. This provides a streamlined assessment and approval process that is defined as a Major Project. Pursuant to Section 75B of the *EP&A Act*, Part 3A applies to:

"the carrying out of development that is declared under this section to be a project to which this part applies:

(a) by a State environmental planning policy, or

(b) by order of the Minister published in the Gazette"

In November 2007 Country Energy submitted a request to the Minster for Planning for a project specific order to be made under Section 75B of the *EP&A Act*. This order was published in the NSW Government Gazette on 1 February 2008 and enables the Project to be determined under Part 3A of the *EP&A Act*. An EAR has been prepared in accordance with Section 75F of the *EP&A Act* (ERM, 2008b). This report has been designed to be read in conjunction with the EAR.

4.2.2 Threatened Species Conservation Act 1995

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 *Threatened Species Conservation Act 1995* (*TSC Act*).

Implications for the Proposal

In accordance with Section 5A of the *EP&A Act*, Assessments of Significance (7-part tests) have been undertaken for threatened species for which potential habitat has been identified in the Project Area. Details of these assessments are located at *Section 7.5* and *Annex C*. Assessments of Significance were conducted in accordance with the *Threatened Species Assessment Guidelines* (DECC, 2007).

4.2.3 Fisheries Management Act 1994

The Fisheries Management Act 1994 (*FM Act*) includes provision to declare and list threatened species of fish and marine vegetation, endangered populations and ecological communities and key threatening processes. Where the proposal involves the disturbance to aquatic or marine areas, assessment of the impact in relation to aquatic habitats and threatened fish species is required.

Implications for the Proposal

As part of ongoing maintenance of the existing electricity supply lines, trimming of mangrove communities identified within the Project Area is conducted on an approximate 2 year cycle, in accordance with a permit issued under the *FM Act* and following notification and approval from the Department of Primary Industries. Apart from routine maintenance of existing electricity easements, the proposed development will not impact upon aquatic habitats or threatened fish species and the provisions of the *FM Act* do not apply.

4.2.4 Native Vegetation Act 2003

The *Native Vegetation Act 2003* (*NV Act*) provides mechanisms for 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

Pursuant to Section 75U(e) of the *EP&A* Act, a project approved under Part 3A of the *EP&A* Act does not require an authorisation to clear native vegetation referred to in Section 12 of the *NV Act*.

4.2.5 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 the Environment.

Implications for the Proposal

Under the *NW Act*, occupiers of land are required to take measures to control noxious weeds. All works associated with the proposed Electricity Network Upgrade will be conducted in accordance with Country Energy's *CEP 2147 Preventing the Spread of Noxious Weeds, Plant and Animal Diseases*.

4.2.6 State Environmental Planning Policy No. 14 – Coastal Wetlands

State Environmental Planning Policy No. 14 (*SEPP 14*) aims to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. Where a proposal occurs within a *SEPP 14* wetland area, an ecological assessment is required to assess the impact of the development.

Implications for the Proposal

Areas mapped as *SEPP 14 - Coastal Wetlands* occur within the locality of the proposed electricity network upgrade. The proposal in relation to these areas is

discussed in *Section 7.1.3* of this report. The proposal will not impact on any areas mapped as *SEPP 14 – Coastal Wetlands*, consequently the provisions of *SEPP 14* do not apply.

4.2.7 State Environmental Planning Policy No. 26 – Littoral Rainforest

State Environmental Planning Policy No. 26 – Littoral Rainforest (*SEPP 26*) aims to preserve areas identified as littoral rainforest and provides a mechanism for the assessment of development that is likely to impact upon these areas. Where a proposal occurs within a *SEPP 26 - Littoral Rainforest* area, an ecological assessment is required to assess the impact of the development.

Implications for the Proposal

The Project Area does not contain any areas mapped as *SEPP 26 - Littoral Rainforest*. Consequently *SEPP 26* does not apply.

4.2.8 State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 (*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 and determining any impacts resulting from the proposal.

Implications for the Proposal

An assessment of the Project Area in accordance with SEPP 44 was undertaken during field investigations. Details of this assessment are located in Section 6.3.1 and Section 7.6 of this report.

4.2.9 State Environmental Planning Policy No. 71 – Coastal Protection

State Environmental Planning Policy No. 71 – Coastal Protection (*SEPP 71*) aims to protect and manage the natural, cultural, recreational and economic attributes of the NSW coast in accordance with the principles of Ecologically Sustainable Development (ESD). This Policy applies to land as mapped within the "coastal zone" which generally includes land within 100m of a coastal water body (e.g. ocean, bay, estuary, lake or wetland).

Implications for the Proposal

Sections of the proposed electricity network route upgrade to the north and west of the Ballina Zone Substation occur within the "coastal zone" as mapped and defined under *SEPP 71*.

Clause 8 of *SEPP 71* outlines matters that must be taken into consideration when preparing and assessing development proposals within the coastal zone. These matters are addressed in the EAR (ERM, 2008b).

5 METHODOLOGY

5.1 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 Project Area and the surrounding local area.

Background information used in the assessment process was collected via:

- a literature review of site-specific and regional studies including:
  - Proposed Lismore to Mullumbimby Electricity Network Upgrade: Line Route Selection Report (ERM, 2008a); and
  - Proposed Lismore to Mullumbimby Electricity Network Upgrade: Project Description Report (ERM, 2008b).
- map, aerial photograph and Geographic Information System (GIS) interpretations;
- the NSW DECC Atlas of NSW Wildlife database (2008a); and
- the Department of the Environment, Water, Heritage and the Arts (DEWHA) on-line search tool for MNES (2008).

Desktop habitat assessments based on known habitat requirements and the presence of suitable habitat within the Project Area were conducted for threatened species that were previously recorded within a 10km radius of the Project Area and included an evaluation of the likelihood of those species to inhabit or utilise the Project Area.

5.2 FIELD SURVEYS

Field surveys of the Project Area were conducted by ERM on the 10th, 11th, 12th and 13th March 2008. The weather during the sampling period was mostly fine with a minimum temperature of 14 degrees celsius (°C) and a maximum temperature of 27 °C (BOM, 2008). Flora and fauna species identified at the Project Area were recorded. Details of flora and fauna survey methods are outlined below.

5.2.1 Flora

Vegetation mapping, aerial photography and previous reporting was assessed prior to field investigations to determine areas that may be potentially impacted as a result of the proposed electricity network upgrade. These areas were the focus of field investigations.

Survey methodology involved driving the entire proposed electricity network route upgrade over the four day period and stopping to assess areas identified as potential ecological constraints in greater detail. Data collected during the desktop assessment was ground-truthed and any additional potential constraint areas identified in the field were also assessed.

In areas where potential constraints were identified the random meander technique was adopted to identify vegetation communities and flora species within the Project Area. This method involves traversing all vegetation communities and topographical features, recording plants as they are encountered. All species observed in addition to physical attributes of the surrounding area were noted during the inspection.

Vegetation of different structural types was delineated from existing vegetation mapping, aerial photography and field verification. The conservation status of vegetation communities was assessed based on their condition, occurrence of threatened flora and assessment of the distribution of the community.

The likelihood of Endangered Ecological Communities (EEC) occurring was determined by considering the dominant plant species that comprise the vegetation communities and the dominant soils present. This assessment was based on vegetation identification guidelines published by DECC and ground-truthing.

5.2.2 *Fauna*

An assessment of the known and potential presence of native fauna species within the Project Area was undertaken, based on database records, previous reports, vegetation mapping and the habitat requirements of threatened species recorded in the locality. The occurrence of habitat resources and threatened species was assessed to identify potential ecological constraints to the proposed activity.

Fauna species were recorded opportunistically while ecologists were in the field. Any evidence of traces such as tracks, scats and scratches on and around trees were also noted as were any potential habitat features.

5.3 *THREATENED SPECIES*

Vegetation maps, previous assessments and field surveys were used to identify and assess the distribution of potential habitat types within the Project Area. An assessment of the potential habitat for 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.

SEPP 44 – Koala Habitat Assessment

A Koala habitat assessment was carried out to determine whether the Project Area provided *core* or *potential* Koala habitat as defined under *SEPP 44*. This involved identifying Koala habitat trees as listed under Schedule 2 of the Policy and determining whether they constituted greater than 15 % of the tree cover at the site. In areas where potential Koala habitat was identified, targeted searches for evidence of Koala habitation was also undertaken and involved searches for scats and scratch ("poc") marks on trees.

5.4 LIMITATIONS

Standardised fauna surveys were not conducted as part of this project. Therefore the presence of threatened fauna along the route cannot be ruled out. However an assessment of the likelihood of threatened species occurring along the route was made on the basis of presence of suitable habitat for such species.

6 RESULTS

6.1 FLORA

The majority of the Project Area consists of cleared agricultural land dominated by crops and grazing. Remnants of eucalypt woodland, forest and dry rainforest are scattered throughout the area in a highly fragmented nature.

Given the large scale of the project, the proposed electricity network upgrade route is divided into sections and vegetation within the Project Area is described according these sections.

A detailed list of flora species recorded during field investigations is located in *Annex A*. Mapping of EECs and *SEPP 14* Coastal Wetlands is provided in *Figure 6.1*, *Figure 6.2* and *Figure 6.3*.

6.1.1 Mullumbimby to Ewingsdale

Within this area, the proposed electricity network upgrade route will occur within the existing cleared electricity easement. The majority of the vegetation within this area is cleared agricultural land dominated by pasture grasses and herbaceous weeds. An area of vegetation occurs in the area where Dingo Lane (refer *Figure 6.1*) intersects the proposed route. This area of vegetation is highly fragmented and disturbed and dominated by Camphor Laurel (*Cinnamomum camphora*) and a variety of weeds although a few native species also occur within the mid-storey including Red Ash (*Alphitonia excelsa*) and Rough Fruit Pittosporum (*Pittosporum undulatum)*.

Where the proposed route occurs within the road reserve area of Myocum Road (refer *Figure 6.1*), vegetation is highly disturbed consisting of a variety of exotic pasture grasses, herbaceous weeds and exotic garden trees including Lasiandra (*Tibouchina spp.*), Frangipani (*Plumeria spp.*) and Jacaranda (*Jacaranda mimosifolia*).

6.1.2 Ewingsdale to Suffolk Park

For most of this section, the proposed electricity network upgrade route will occur within the existing electricity easement. This is with the exception of an area to the south east of the Ewingsdale substation where the underground installation of the electricity supply line is proposed within the road reserve of Parkway Drive (refer *Figure 6.2*).

The majority of vegetation within the Ewingsdale to Suffolk Park section of the proposed route consists of agricultural land dominated by pasture grasses and herbaceous weeds. Occasional areas of vegetation dominated by Camphor Laurel and exotic garden trees also occur adjacent to the proposed route.

Areas of vegetation identified as Swamp Sclerophyll Forest were also found adjacent to the proposed route (refer *Figure 6.2).* Swamp Sclerophyll Forest is listed as an EEC under the TSC Act. Broad-leaved Paperbark (Melaleuca quinquenervia) was the dominant species within these areas.

Vegetation identified as Moist Sclerophyll Forest was identified in the area adjacent to Raywards Lane (refer *Figure 6.2*). Blackbutt (*Eucalyptus pilularis*) and Tallowwood (*Eucalyptus microcorys*) were the dominant species identified in the upper stratum. Brush Box (*Lophostemon confertus*) and Pink Bloodwood (*Corymbia intermedia*) also occurred as sub-dominant species. A number of native and exotic species were identified within the mid stratum and ground cover with weed infestation greatest close to road edges.

6.1.3 Suffolk Park to Lennox Head

Within this section, the proposed electricity network upgrade route will occur within the existing electricity easement. The majority of vegetation within this section consists of cleared agricultural land containing exotic pasture grasses, a variety of herbaceous weeds and Sugarcane (*Saccharum officinarum*) and Macadamia (*Macadamia integrifolia*) crops. Other areas of vegetation identified adjacent to the proposed route include areas to the north of Midgen Flat Road (refer *Figure 6.2*) described as regrowth dry rainforest with Camphor Laurel invasion. Dominant trees in this area include Brush Box and Pink Bloodwood. Other rainforest species identified in this area include Umbrella Cheese Tree (*Glochidion sumatranum*), Blueberry Ash (*Elaeocarpus reticulates*), Lilly Pilly (*Acmena smithii*) and Midgen Berry (*Austromyrtus dulcis*).

Vegetation within Newrybar Swamp which is located to the east of the proposed route and Newrybar Swamp Road (refer *Figure 6.2*) is identified as the EEC Swamp Sclerophyll Forest. Broad-leaved Paperbark and Swamp Oak (*Casuarina glauca*) are the dominant species identified in this community. Another area further to the south, opposite the Lennox Head Aquatic Centre and to the west of the proposed route is also identified as Swamp Sclerophyll Forest (refer *Figure 6.2*).

6.1.4 Lennox Head to Ballina

For most of this section, the proposed electricity network upgrade route will occur within the existing electricity easement with the exception of a few areas. Deviations to the existing route are planned for the Sandy Flat and Cumbalum areas to allow for the Pacific Highway Ballina Bypass. These deviations have been assessed and approved as part of the planned Bypass. Another deviation is proposed for an area to the north of Ballina between North Creek Canal and the Pacific Highway (refer *Figure 6.3*).

Within this section of the route, vegetation adjacent to the proposed electricity network upgrade route is predominantly cleared pasture and roadside vegetation comprised of exotic grasses, herbaceous weeds and Sugarcane and Macadamia crops. Other areas of vegetation identified include isolated clumps of Forest Red Gum (*Eucalyptus tereticornis*) trees and some swampy areas dominated by Common Reed (*Phragmites australis)*. A Mangrove community was also identified adjacent to North Creek Canal.

6.1.5 Ballina to Alstonville

Within this section, the majority of the proposed electricity network route upgrade is within the existing electricity easement. A deviation to the west of Teven Road and to the north of the Pacific Highway has been assessed and approved as part of the planned Pacific Highway Ballina Bypass. Another deviation is proposed for the area to the north of the Bruxner Highway and to the west of Westbridge Lane. A small deviation to the east of Barlows Road is also proposed (refer *Figure 6.3*).

The majority of this section of the proposed route upgrade occurs within agricultural land and road reserves. Vegetation in these areas consists primarily of exotic grasses, herbaceous and woody weeds, Sugarcane and exotic garden trees. Patches of Eucalypt Woodland and Sclerophyll Forest were also identified along the proposed route. Species identified within these communities included Blackbutt (*Eucalyptus pilularis*), Brush Box and Narrow-leaved Wattle (*Acacia longissima*). Camphor Laurel and Lantana (*Lantana camara*) were also prevalent within these areas.

Within this section, a number of mangrove communities were identified adjacent to Fishery Creek and Emigrant Creek. In addition, an area of vegetation located to the west of Barlows Road and Fishery Creek (refer *Figure 6.3*) was identified as Swamp Oak Floodplain Forest which is an EEC under the *TSC Act*.

6.1.6 Alstonville to Lismore

Within this area, the proposed electricity network upgrade route will occur within the existing cleared electricity easement (refer *Figure 6.1*). The majority of vegetation within this area is cleared pasture and Macadamia crops with occasional patches of isolated Eucalypt and Camphor Laurel trees.

6.1.7 Endangered Ecological Communities

Two EECs were identified within the Project Area during field investigations. These communities are:

- Swamp Sclerophyll Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions; and
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions.

The location of these EECs within the Project Area are shown on *Figure 6.1*.

6.1.8 SEPP 14 – Coastal Wetlands

A number of coastal wetlands that are listed under SEPP 14 were identified within the Project Area. The location of SEPP 14 wetlands within the Project Area is shown on *Figure 6.1*.

6.2 FAUNA

Targeted fauna surveys were not conducted along the route. Opportunistic observations during vegetation surveys yielded 10 bird species considered to be common in the area. These are listed in *Annex A*.

6.2.1 Fauna Habitat

Field investigations revealed that potentially suitable fauna habitat exists within the Project Area in the form of:

- fresh / estuarine wetlands;
- modified grasslands;
- Swamp Sclerophyll Forest;
- Swamp Oak Forest;
- mangroves;
- remnant Eucalypt Woodland;
- remnant Moist Sclerophyll Forest; and
- regrowth / remnant Dry Rainforest.

Few mature trees were identified that would contain hollows suitable for sheltering and breeding habitat within the Project Area.

6.2.2 Key Habitats and Regional Corridors

Mapping provided by NSW DECC (Scotts,2003) indicates the Project Area supports a number of fauna movement corridors (refer *Figure 6.1*).

6.3 THREATENED SPECIES

A search of the DECC Atlas of NSW Wildlife database (2008a) revealed that 98 threatened fauna species and 67 threatened flora species had previously been recorded within the locality. An online search of MNES (DEWHA, 2008) showed that an additional 6 threatened fauna species and 5 threatened flora species were also recorded within the locality. The likelihood of these species utilising or inhabiting the Project Area was assessed by comparing known habitat requirements with habitat present within the Project Area (*Annex B*).

Habitat assessment showed that the following threatened species had a moderate to high likelihood of utilising or inhabiting the Project Area:

- Black-necked Stork (*Ephippiorhynchus asiaticus*);
- Black Bittern (*Ixobrychus flavicollis*);

- Osprey (*Pandion haliaetus*);
- Grass Owl (*Tyto capensis*);
- Koala (*Phascolarctos cinereus*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Rusty Plum (*Amorphospermum whitei*);
- Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*);
- Red Lilly Pilly (*Syzygium hodgkinsoniae*);
- Durobby (*Syzygium moorei*); and
- Arrow-head Vine (*Tinospora tinosporoides*).

Plant specimens collected by Country Energy personnel revealed the presence of Arrow-head Vine and possibly Red Lilly Pilly (lack of identifying features made positive identification difficult) within an area of vegetation to the south of the proposed electricity network route upgrade in the Skinners Shoot locality. These species are listed as Vulnerable under the *TSC Act* and *EPBC Act*.

Assessments of Significance (7-Part Tests) (refer *Annex C*) were conducted for threatened species identified within the Project Area and also those species considered to have a moderate to high likelihood of utilising the Project Area.

6.3.1 SEPP 44 - Koala Habitat Assessment

Isolated stands of remnant Eucalypt woodland and other remnant vegetation containing Eucalypt trees occur throughout the Project Area.

The Koala was not recorded during field investigations although a search of the DECC Atlas of NSW Wildlife Database (2008a) revealed a number of previous records within the area.

Assessment of the Project Area under *SEPP 44* revealed the presence of three Koala feed tree species as listed under Schedule 2 of the Policy. These are Swamp Mahogany (*Eucalyptus robusta*), Forest Red Gum and Tallowwood. Given the highly modified nature of the environment within the Project Area, these species constituted less than 15% of the total tree cover within the Project Area. Consequently, the Project Area is not defined as '*potential*' or '*core*' Koala habitat under the provisions of *SEPP 44*.

7 DISCUSSION

7.1 FLORA

7.1.1 Vegetation Removal

The majority of the proposed electricity network route upgrade will occur within existing easements and access will be via existing service routes. Within existing easements, a cleared corridor is maintained under the *Electricity Supply Act 1995* to prevent damage to infrastructure and provide a cleared area for routine maintenance of power lines.

In instances where electricity pole replacement is necessary as part of the proposed upgrade, a minimal amount of vegetation maintenance may be required in cases where vegetation has regrown. This maintenance would be conducted in accordance with existing legislation.

In cases where deviations from the existing route are proposed, vegetation impacts have been assessed on a case by case basis as follows.

Ewingsdale

The deviation proposed for the area to the south east of the Ewingsdale substation would involve the underground installation of an electricity supply line within the road reserve of Parkway Drive and McGettigans Lane (refer *Figure 6.2*). Vegetation in this area is predominantly exotic grasses, herbaceous weeds and exotic garden plants. As the proposed electricity supply line installation will be within the existing road reserve, minimal vegetation removal will be required.

Ballina

Deviations within the Sandy Flat and Cumbalum areas, and a deviation to the west of Teven Road (refer *Figure 6.3*) have been assessed and approved as part of the planned Pacific Highway Ballina Bypass.

The deviation proposed for the area between North Creek Canal and the Pacific Highway (refer *Figure 6.3*) will involve the above ground installation of dual circuit lines south east along the Pacific Highway and south west across predominantly cleared paddocks. Minimal vegetation removal will be required in this area.

The small proposed deviation along Barlows Road (refer *Figure 6.3*) will involve the above ground installation of an electricity supply line on the north eastern side of Barlow's Road. No native vegetation removal will be required within this area.

Alstonville

The deviation proposed for the area to the north of the Bruxner Highway and to the west of Westbridge Lane (refer *Figure 6.3*) would involve the installation of an above ground electricity supply line parallel to the Bruxner Highway. Vegetation in this area is predominantly cleared pasture with remnant stands of Blackbutt, Tallowwood and Brush

Box trees. The electricity supply line and associated poles will be positioned in this area to minimise native vegetation clearing.

7.1.2 Endangered Ecological Communities

The EECs of Swamp Sclerophyll Forest and Swamp Oak Forest were identified within the Project Area. All areas of the proposed electricity network route upgrade that occur within close proximity to EECs will occur within existing easements and will not require vegetation removal. Measures will need to be adopted in these areas to minimise disturbance and weed invasion. With the adoption of mitigation measures outlined in *Section 8*, any potential disturbance to these areas as a result of the proposal will be minimal and short term.

7.1.3 SEPP 14 – Coastal Wetlands

Coastal Wetlands No. 79, 84, 93, 95 and 108 occur within close proximity to the proposed electricity network route upgrade. These areas of the proposed route will occur within existing easements and will not require vegetation removal. Access to these areas will be via existing service points and care will be taken during the upgrade to minimise disturbance, weed invasion and sedimentation via the adoption of mitigation measures outlined in *Section 8*. Existing transmission poles are located outside of SEPP 14 areas and it is considered that the proposed upgrade is achievable with minimal potential for impact.

7.2 FAUNA

The majority of the proposed electricity network route upgrade will occur within existing electricity easements and will have minimal potential impact on native fauna and fauna movement corridors identified within the area (refer *Figure 6.1*). Fauna movement corridors are not expected to be significantly affected by the proposal such that their corridor function would be compromised.

7.3 THREATENED SPECIES

Two possible records of threatened flora species were identified in an area of vegetation adjacent to the proposed electricity network route upgrade (refer *Section 6.3*). These species will not be affected by the proposal.

A search of the DECC Atlas of NSW Wildlife Database (2008a) showed that a number of other threatened flora and fauna species have previously been recorded within the locality. Assessments of Significance (refer *Section 7.5* and *Annex C*) were conducted for these species to determine whether the proposal would have the potential to significantly impact upon these species. A summary of these assessments is provided in *Section 7.5*.

7.4 COMMONWEALTH EPBC ACT ASSESSMENT

The Commonwealth *EPBC Act* requires approval for actions that may have a significant impact on MNES. Threatened and migratory species as listed under the *EPBC Act* have been identified as potentially occurring within the Project Area (DEWHA, 2008).

7.4.1 Threatened Species

Habitat assessment of the Project Area showed that one fauna and three flora species listed as Vulnerable under the *EPBC Act* have a moderate to high likelihood of occurring within the Project Area (refer *Annex B)*. These species are:

- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Red Lilly Pilly (*Syzygium hodgkinsoniae*);
- Durobby (*Syzygium moorei*); and
- Arrow-head Vine (*Tinospora tinosporoides*).

In accordance with the administrative guidelines (DEH, 2006) for determining the likely impact of the proposal on threatened species listed under the *EPBC Act*, the proposal is unlikely to have a significant impact on important populations of these species as it is unlikely to:

1. lead to a long-term decrease in the size of a population;
2. reduce the area of occupancy of the species;
3. fragment an existing population;
4. adversely affect critical habitat;
5. disrupt the breeding cycle of a population;
6. affect the availability or quality of habitat to the extent that the species is likely to decline;
7. result in harmful invasive species becoming established within the Project Area;
8. introduce disease that may cause species decline; or
9. interfere with the recovery of the species.

Assessment concludes that threatened species, communities and populations as listed under the *EPBC* Act, are not going to be placed at risk of extinction by the proposal with the adoption of mitigation measures.

7.4.2 Migratory Species

A search of the DEWHA Database for MNES (2008) showed that eleven migratory bird species have been identified as occurring or having the potential to occur within 10km of the Project Area. Assessment of the potential impact on migratory species was undertaken in accordance with the *EPBC Act Significant Impact Guidelines* (DEH,

2006). Given the nature of the proposal and the fact that these species are wide-ranging with generalist habitat requirements it was considered that the proposal is unlikely to have a significant impact on these species and was not considered to:

1. substantially modify, destroy or isolate an area of important habitat of the migratory species;

2. result in harmful invasive species becoming established within the Project Area; or

3. disrupt the life cycle of an ecologically significant proportion of a population of the species.

7.4.3 Conclusion

Having applied the *EPBC Act Significant Impact Guidelines* (DEH, 2006), the project is not likely to have a significant impact on each of the relevant listed vulnerable and migratory species. The project will not have or is not likely to have a significant impact on MNES under the *EPBC Act* and therefore further assessment and approval under the *EPBC Act* is not required.

7.5 NSW THREATENED SPECIES CONSERVATION ACT ASSESSMENT

Section 5A of the *EP&A* Act sets out seven factors that need to be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats listed under the *TSC Act* or *FM Act*.

The threatened species and ecological communities listed below were considered to have potential habitat within the Project Area and were considered to have the potential to be impacted by the proposal (*Annex B*).

Table 7.1 Threatened Species Assessed under the TSC Act

Common Name	Scientific Name
Black-necked Stork	*Ephippiorhynchus asiaticus*
Black Bittern	*Ixobrychus flavicollis*
Osprey	*Pandion haliaetus*
Grass Owl	*Tyto capensis*
Koala	*Phascolarctos cinereus*
Grey-headed Flying-fox	*Pteropus poliocephalus*
Rusty Plum	*Amorphospermum whitei*
Green-leaved Rose Walnut	*Endiandra muelleri ssp. bracteata*
Red Lilly Pilly	*Syzygium hodgkinsoniae*
Durobby	*Syzygium moorei*
Arrow-head Vine	*Tinospora tinosporoides*
Swamp Oak Floodplain Forest	
Swamp Sclerophyll Forest	

7.5.1 Conclusion

Assessment under Section 5A of the NSW *EP&A Act* found that the proposal incorporating mitigation measures was unlikely to have a significant effect on those species or ecological communities under consideration (*Annex C*) owing largely to the absence of particular habitat features and the minimal level of potential disturbance resulting form the proposal.

7.6 SEPP 44 HABITAT ASSESSMENT

Although the Project Area is not defined as *'potential'* or *'core'* Koala habitat under the provisions of *SEPP 44*, the number of previous records identified adjacent to the proposed electricity network upgrade route suggest that it is possible that Koalas may traverse the Project Area and browse on isolated remnant feed trees as part of their home range.

Any vegetation removal proposed within the Project Area will be minimal and unlikely to disrupt the life cycle of this species such that a viable population would be placed at risk of extinction. Any clearing in areas containing feed trees should be avoided during the Koala breeding season (September to March) and should be in conjunction with pre-clearance fauna surveys.

8 CONCLUSION AND MITIGATION AND MANAGEMENT MEASURES

The majority of the proposed electricity network route upgrade will occur within existing electricity easements and access will be via existing service points. In areas where deviations from existing easements are proposed, vegetation removal will be minimal. Deviations are not proposed into areas of ecological significance.

The following mitigation measures will be adopted to further reduce the potential for impact:

- implement erosion and sediment control measures during any clearing in accordance with Country Energy's *CEM 7022 Environmental Operations Manual*, particularly around wetland and creek habitats;
- responsible management of weeds in accordance with Country Energy's *CEM 7022 Environmental Operations Manual and CEPG 2147 Preventing the Spread of Noxious Weeds, Plant and Animal Diseases* and the requirements of the *NW Act* to avoid the spread of weeds, particularly within *SEPP 14* areas and areas containing EECs;
- minimise disturbance/removal of existing native vegetation and potential fauna habitat (e.g. hollow bearing trees) where possible during installation of electricity supply lines;
- conduct pre-clearance fauna surveys in areas where potential fauna habitat is identified and where removal is required;
- stage works to avoid disturbance to threatened fauna that may potentially inhabit the area during their breeding season (e.g. Koala and Osprey – refer *Annex C*).
- construct protection barriers around areas of vegetation near the existing route to prevent potential damage; and
- obtain professional advice from an Arborist in areas where there is potential for root damage to native trees.

With the adoption of the mitigation measures outlined above, it is determined that the potential ecological impacts resulting from the proposal will be minimal and short term.

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Annex A

Species Lists

Table A0.1 Flora Species Identified within the Project Area

Family	Scientific Name	Common Name
Apocynaceae	*Alyxia ruscifolia*	Prickly Alyxia
Apocynaceae	*Araujia sericifera**	Moth Vine
Apocynaceae	*Parsonsia induplicata*	Thin-leaved Silkpod
Apocynaceae	*Plumeria spp.**	Frangipani
Araliaceae	Schefflera actinophylla*	Umbrella Tree
Araucariaceae	*Araucaria cunninghamii*	Hoop Pine
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern
Aspleniaceae	*Asplenium australasicum f. australasicum*	Bird's Nest Fern
Asteliaceae	*Cordyline stricta*	Narrow-leaved Palm Lily
Asteraceae	*Ageratina adenophora**	Crofton Weed
Asteraceae	*Ageratina riparia**	Mistflower
Asteraceae	*Ambrosia spp.**	Ragweed
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asteraceae	*Delairea odorata**	Cape Ivy
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine
Blechnaceae	*Blechnum indicum*	Swamp Water Fern
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Commelinaceae	*Commelina cyanea*	Native Wandering Jew
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Convolvulaceae	*Ipomoea cairica**	Coastal Morning Glory
Cunoniaceae	*Callicoma serratifolia*	Black Wattle
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge
Cypressaceae	*Coast Cypress Pine*	Callitris columellaris
Davalliaceae	*Davallia solida*	Hare's Foot Fern
Davalliaceae	*Nephrolepis cordifolia**	Fishbone Fern
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Ericaceae	*Trochocarpa laurina*	Tree Heath
Euphorbiaceae	*Alchornea ilicifolia*	Native Holly
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Euphorbiaceae	*Glochidion sumatranum*	Umbrella Cheese Tree
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart
Euphorbiaceae	*Ricinus communis**	Castor Oil Plant
Eupomatiaceae	*Eupomatia laurina*	Bolwarra
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata**	Cassia
Fabaceae (Caesalpinioideae)	*Senna septemtrionalis**	Arsenic Bush
Fabaceae (Faboideae)	*Desmodium uncinatum**	Silver-leaved Desmodium
Fabaceae (Faboideae)	*Erythrina X sykesii**	Coral Tree
Fabaceae (Faboideae)	*Kennedia rubicunda*	Red Kennedy Pea
Fabaceae (Mimosoideae)	*Acacia longissima*	Narrow-leaved Wattle
Fabaceae (Mimosoideae)	*Acacia melanoxylon*	Blackwood
Geraniaceae	*Geranium solanderi*	Native Geranium
Juncaceae	*Juncus usitatus*	Common Rush
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Lauraceae	*Endiandra sieberi*	Hard Corkwood
Lauraceae	*Litsea australis*	Brown Bolly Gum
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
Melastomataceae	*Tibouchina spp.**	Lasiandra

Family	Scientific Name	Common Name
Meliaceae	*Synoum glandulosum*	Scentless Rosewood
Menispermaceae	*Stephania japonica*	Snake Vine
Menispermaceae	*Tinospora tinosporoides*	Arrow-head Vine
Moraceae	*Ficus rubiginosa*	Port Jackson Fig
Musaceae	*Musa spp.**	Banana
Myrsinaceae	*Aegiceras corniculatum*	River Mangrove
Myrtaceae	*Acmena smithii*	Lilly Pilly
Myrtaceae	*Austromyrtus dulcis*	Midgen Berry
Myrtaceae	*Corymbia intermedia*	Pink Bloodwood
Myrtaceae	*Eucalyptus microcorys*	Tallowwood
Myrtaceae	*Eucalyptus pilularis*	Blackbutt
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Lophostemon confertus*	Brush Box
Myrtaceae	*Melaleuca quinquenervia*	Broad-leaved Paperbark
Myrtaceae	*Psidium cattleianum**	Cherry Guava
Myrtaceae	*Psidium guajava**	Guava
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Myrtaceae	*Syzygium oleosum*	Blue Lilly Pilly
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Passifloraceae	*Passiflora edulus**	Common Passionfruit
Passifloraceae	*Passiflora subpeltata**	White Passionflower
Phormiaceae	*Dianella caerulea*	Blue Flax-lily
Phytolaccaceae	*Phytolacca octandra**	Inkweed
Pinaceae	*Pinus radiata**	Radiata Pine
Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn
Pittosporaceae	*Pittosporum revolutum*	Rough Fruit Pittosporum
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Chloris gayana**	Rhodes Grass
Poaceae	*Cynodon dactylon**	Couch
Poaceae	*Oplismenus spp.**	Basket Grass
Poaceae	*Paspalum wettsteinii*	Broad-leaved Paspalum
Poaceae	*Phragmites australis*	Common Reed
Poaceae	*Phyllostachys spp.**	Bamboo
Poaceae	*Saccharum officinarum**	Sugarcane
Poaceae	*Setaria spp.**	Pigeon Grass
Polygonaceae	*Persicaria spp.*	Knotweed
Polypodiaceae	*Platycerium superbum*	Staghorn
Polypodiaceae	*Pyrrosia rupestris*	Rock Felt Fern
Proteaceae	*Banksia oblongifolia*	Fern-leaved Banksia
Proteaceae	*Grevillea robusta*	Silky Oak
Proteaceae	*Macadamia integrifolia**	Macadamia Nut
Proteaceae	*Persoonia adenantha*	Geebung
Rhamnaceae	*Alphitonia excelsa*	Red Ash
Rosaceae	*Rubus moluccanus*	Molucca Bramble
Rubiaceae	*Pomax umbellata*	Pomax
Rutaceae	*Melicope elleryana*	Pink Euodia
Rutaceae	*Zieria smithii*	Sandfly Zieria
Sapindaceae	*Cupaniopsis anacardioides*	Tuckeroo
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush
Smilacaceae	*Smilax australis*	Barbwire Vine
Solanaceae	*Solanum mauritianum**	Wild Tobacco Bush
Solanaceae	*Solanum seaforthianum**	Brazilian Nightshade
Typhaceae	*Typha orientalis*	Broad-leaved Cumbungi
Uvulariaceae	*Tripladenia cunninghamii*	
Verbenaceae	*Lantana camara**	Lantana
Verbenaceae	*Verbena bonariensis**	Purple Top
Vitaceae	*Cissus hypoglauca*	Giant Water Vine

Family	Scientific Name	Common Name
Xanthorrhoeaceae	*Xanthorrhoea spp.*	Grass Tree
Zingiberaceae	*Alpinia caerulea*	Native Ginger
* Denotes Introduced Species		

Table A0.2 Fauna Species Recorded within the Project Area

Family	Scientific Name	Common Name
Birds		
Artamidae	*Cracticus torquatus*	Grey Butcherbird
Artamidae	*Gymnorhina tibicen*	Australian Magpie
Charadriidae	*Vanellus miles*	Masked Lapwing
Columbidae	*Ocyphaps lophotes*	Crested Pigeon
Corvidae	*Corvus coronoides*	Australian Raven
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail
Eupetidae	*Psophodes olivaceus*	Eastern Whip Bird
Estrildidae	*Neochmia temporalis*	Red-browed Finch
Psittacidae	*Platycercus adscitus eximius*	Eastern Rosella
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis
Mammals		
Bovidae	*Bos taurus**	European Cattle

* Denotes Introduced Species

Annex B

Threatened Species Habitat Assessment

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Birds					
Amaurornis olivaceus	Bush-hen	V	-	Variety of coastal wetlands from mangroves, lagoons and swamps, to river margins and creeks running through rainforest. Appear to be uncommon residents from the Queensland border to the Clarence River (DECC, 2008b).	Low-Moderate
Anseranas semipalmata	Magpie Goose	V	-	Mainly found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges (DECC, 2008b).	Low-Moderate
Atrichornis rufescens	Rufous Scrub-bird	V	-	High altitude subtropical, warm temperate and cool temperate rainforest, and moist eucalypt forest with rainforest middle storey. Inhabit densely vegetated lower levels of the forest where it is moist, humid and has deep leaf litter (DECC, 2008b).	Low
Botaurus poiciloptilus	Australasian Bittern	V	-	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha spp.*) and spikerushes (*Eleoacharis spp.*) (DECC, 2008b).	Low
Burhinus grallarius	Bush Stone-curlew	E	-	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber (DECC, 2008b).	Low
Calidris alba	Sanderling	V	-	Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons. Individuals are rarely recorded in near-coastal wetlands (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Calidris tenuirostris	Great Knot	V	-	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms (DECC, 2008b).	Low
Calyptorhynchus banksii banksii	Red-tailed Black-cockatoo	V	E	In coastal north-east NSW, they have been recorded in dry open forest and areas of mixed rainforest/eucalypt forest (DECC, 2008b). Formerly occurred in far northern coastal NSW but have been no recent document sightings (Cameron, 2007).	Low
Calyptorhynchus lathami	Glossy Black-cockatoo	V	-	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 littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. Dependent on large hollow-bearing eucalypts for nest sites (DECC, 2008b).	Low-Moderate
Charadrius leschenaultii	Greater Sand-plover	V	-	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks (DECC, 2008b).	Low
Charadrius mongolus	Lesser Sand-plover	V	M	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats. Occasionally occurs on sandy beaches, coral reefs and rock platforms (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Climacteris picumnus	Brown Treecreeper	V	-	Dry open eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range with open grassy understorey. Less commonly found on coastal plains and ranges. Fallen timber is an important habitat component for foraging. Hollows in standing dead or live trees and tree stumps are essential for nesting (DECC, 2008b).	Low
Coracina lineata	Barred Cuckoo-shrike	V	-	Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. Rare in NSW (DECC, 2008b).	Low-Moderate
Cyclopsitta diophthalma coxeni	Double-eyed Fig-parrot	E	E, M	Usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. Also found in the wetter lowland rainforests that are now largely cleared in NSW. Shows a decided preference for fig trees, but also feeds on other fruiting rainforest species (DECC, 2008b).	Low-Moderate
Diomedea dabbenena	Tristan Albatross	-	E, M	Marine. Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation.	Low – no suitable habitat along route.
Diomedea exulans	Wandering Albatross	E	V	Spends the majority of their time in flight, soaring over the southern oceans. Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation (DECC, 2008b).	Low – no suitable habitat along route.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	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 (DECC, 2008b).	**Moderate**
Erythrotriorchis radiatus	Red Goshawk	E	V	Very rare in NSW. In NSW, the Red Goshawk is mainly found along or near watercourses in swamp forest and woodlands on the coastal plain. Favours patches of dense forest interspersed with open woodland or cleared land and often frequents forest edges (DECC, 2008b).	Low-Moderate
Grus rubicunda	Brolga	V	-	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged (DECC, 2008b).	Low-Moderate
Gygis alba	White Tern	V	-	Marine. Occurs widely in tropical and subtropical seas and islands. Nests in the high branches of trees (DECC, 2008b).	Low
Haematopus fuliginosus	Sooty Oystercatcher	V	-	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries (DECC, 2008b).	Low
Haematopus longirostris	Pied Oystercatcher	V	-	Favours intertidal flats of inlets and bays, open beaches and sandbanks (DECC, 2008b).	Low
Irediparra gallinacea	Comb-crested Jacana	V	-	Inhabits permanent wetlands with a good surface cover of floating vegetation, especially water-lilies (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ixobrychus flavicollis	Black Bittern	V	-	Inhabits terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. May occur in flooded grassland, forest, woodland, rainforest and mangroves (DECC, 2008b).	**Moderate**
Lathamus discolor	Swift Parrot	E	E	Migrates to the Australian south-east mainland between March and October where they are found in areas where winter flowering eucalypts are blossoming profusely or where there are abundant lerp infestations (DECC, 2008b).	Low
Lichenostomus fasciogularis	Mangrove Honeyeater	V	-	Rare in NSW. Primary habitat is mangrove forest but the species also occurs in other near-coastal forests and woodlands, including *Casuarina* and Paperbark swamp forests (DECC, 2008b).	Low-Moderate
Limicola falcinellus	Broad-billed Sandpiper	V	-	Favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Roost on banks on sheltered sand, shell or shingle beaches (DECC, 2008b).	Low
Limosa Limosa	Black-tailed Godwit	V	-	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10cm deep, around muddy lakes and swamps (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Lophoictinia isura	Square-tailed Kite	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses (DECC, 2008b).	Low
Macronectes giganteus	Southern Giant Petrel	E	E, M	Marine. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory (DECC, 2008b).	Low – no suitable habitat along route.
Macronectes halli	Northern Giant Petrel	V	V, M	Marine. Breeding in Australian territory is limited to Macquarie Island during spring and summer (DECC, 2008b).	Low – no suitable habitat along route.
Menura alberti	Albert's Lyrebird	V	-	Mixed rainforest and wet open forest, frequently dominated by Brush Box (DECC, 2008b).	Low-Moderate
Monarcha leucotis	White-eared Monarch	V	-	In NSW this species occurs primarily in coastal rainforest, swamp forest and wet eucalypt forest. Appears to favour rainforest edges where trees are frequently covered with vines and through the canopy of more extensive patches of rainforest (DECC, 2008b).	Low-Moderate
Ninox connivens	Barking Owl	V	-	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large Eucalypts. Rarely recorded in the coastal and escarpment forests of NSW (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Ninox strenua	Powerful Owl	V	-	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. 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 (*Angorphora floribunda*), Cherry *Ballart* (*Exocarpus cupressiformis*) and a number of eucalypt species. Nest in large tree hollows (at least 0.5m deep) in large eucalypts (diameter at breast height 80-240 cm) that are at least 150 years old (DECC, 2008b).	Lo
Pachycephala olivacea	Olive Whistler	V	-	Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes (DECC, 2008b).	Low
Pandion haliaetus	Osprey	V	-	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 1km of the sea (DECC, 2008b).	**Moderate**
Pezoporus wallicus wallicus	Eastern Ground Parrot	V	-	Occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below 1m in height and very dense (up to 90% projected foliage cover) (DECC, 2008b).	Low – no suitable habitat along route.
Phaethon rubricauda	Red-tailed Tropicbird	V	-	Marine. Breeds in coastal cliffs and under bushes in tropical Australia (DECC, 2008b).	Low – no suitable habitat along route.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Phoebetria fusca	Sooty Albatross	V	V	Marine. Nests are located amongst vegetation on steep cliffs and consist of a mound of mud and plant matter, lined with grass (DECC, 2008b).	Low – no suitable habitat along route.
Podargus ocellatus	Marbled Frogmouth	V	-	Prefers subtropical rainforest spending most time in deep, wet, sheltered gullies frequently containing stands of Bangalow Palms. Less frequently occurs in higher elevation temperate rainforests and wet eucalypt forest with a well-developed rainforest understorey (DECC, 2008b).	Low
Poephila cincta cincta	Black-throated Finch	E	E	Very rare in NSW. Inhabits Eucalypt woodland and riverside vegetation, including Paperbark and Wattle shrubland. Areas close to water with a dense understorey of seeding grass and shrubs are favoured (DECC, 2008b).	Low
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-Pine and open Box Woodlands on alluvial plains (DECC, 2008b).	Low
Procelsterna cerulea	Grey Ternlet	V	-	Marine. Breeds on Lord Howe Island on seacliffs and also on offshore islands including Admiralty Islets, Muttonbird Island and Ball's Pyramid (DECC, 2008b).	Low – no suitable habitat along route.
Pterodroma leucoptera leucoptera	Gould's Petrel	E	E	Marine. Breeds on both Cabbage Tree Island, 1.4km offshore from Port Stephens and on nearby Boondelbah island.	Low – no suitable habitat along route.
Pterodroma neglecta neglecta	Kermadec Petrel	V	V	Marine. In Australia, it breeds on Ball's Pyramid and Phillip Island (near Norfolk Island).	Low – no suitable habitat along route.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Pterodroma nigripennis	Black-winged Petrel	V	-	Marine. Nests at numerous sites on Lord Howe Island (DECC, 2008b).	Low – no suitable habitat along route.
Pterodroma solandri	Providence Petrel	V	-	Marine. Only known breeding sites are at Lord Howe Island and Philip Island (DECC, 2008b).	Low – no suitable habitat along route.
Ptilinopus magnificus	Wompoo Fruit-dove	V	-	Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests where it feeds on a diverse range of tree and vine fruits. Most often seen in mature forests, but also found in remnant and regenerating rainforest (DECC, 2008b).	Low-Moderate
Ptilinopus regina	Rose-crowned Fruit-dove	V	-	Occurs mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful (DECC, 2008b).	Low-Moderate
Ptilinopus superbus	Superb Fruit-dove	V	-	Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Most often seen in mature forests, but also found in remnant and regenerating rainforest (DECC, 2008b).	Low-Moderate
Puffinus assimilis	Little Shearwater	V	-	Marine. Breeding sites at Lord Howe Island (DECC, 2008b).	Low – no suitable habitat along route.
Puffinus carneipes	Flesh-footed Shearwater	V	-	Marine. Nest on Lord Howe Island in forests on sandy soils (DECC, 2008b).	Low – no suitable habitat along route.

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Rostratula benghalensis	Painted Snipe	E	V, M	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 (DECC, 2008b).	Low
Stagonopleura guttata	Diamond Firetail	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland (DECC, 2008b).	Low
Sterna albifrons	Little Tern	E	-	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands (DECC, 2008b).	Low
Sterna fuscata	Sooty Tern	V	-	Large flocks can be seen over off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Stictonetta naevosa	Freckled Duck	V	-	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. Generally rest in dense cover during the day, usually in deep water (DECC, 2008b).	Low
Sula dactylatra	Masked Booby	V	-	Marine. Remain at Lord Howe Island year around but range widely for food and some juveniles wander before returning to breed (DECC, 2008b).	Low – no suitable habitat along route.
Thalassarche cauta	Shy Albatross	V	V	Marine. Occasionally occurs in continental shelf waters, in bays and harbours (DECC, 2008b).	Low – no suitable habitat along route.
Thalassarche impavida	Campbell Albatross	-	V, M	Marine. Occasionally occurs in continental shelf waters, in bays and harbours.	Low – no suitable habitat along route.
Todiramphus chloris	Collared Kingfisher	V	-	Restricted to mangroves and other estuarine habitats and mainly occur about the mouths of the larger coastal rivers. Nests are usually in a hollow in a mangrove tree or drilled into termite nests in a large Eucalypt or Paperbark adjacent to mangroves (DECC, 2008b).	Low-Moderate

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Turnix maculosa	Red-backed Button-quail	V	-	Inhabit grasslands, woodlands and cropped lands of warm temperate areas that annually receive 400mm or more of summer rain. Prefers sites near water, including grasslands and sedgelands near creeks, swamps and springs, and wetlands. Breed in dense grass near water (DECC, 2008b).	Low-Moderate
Turnix melanogaster	Black-breasted Button-quail	E	V	Prefers drier rainforests and viney scrubs, often in association with Hoop Pine and a deep, moist leaf litter layer (DECC, 2008b).	Low-Moderate
Tyto capensis	Grass Owl	V	-	Tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath and cane grass or sedges on flood plains. Rest by day in a 'form' - a trampled platform in a large tussock or other heavy growth (DECC, 2008b).	**Moderate**
Tyto novaehollandiae	Masked Owl	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1100m. A forest owl, but often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting (DECC, 2008b).	Low
Tyto tenebricosa	Sooty Owl	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation. Nests in very large tree-hollows (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Xanthomyza phrygia	Regent Honeyeater	E	E, M	Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Often found in Box-Ironbark woodland and riparian forests of River She-oak 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 (DECC, 2008b).	Low
Xenus cinereus	Terek Sandpiper	V	-	Recorded on 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 (DECC, 2008b).	Low-Moderate
Frogs					
Assa darlingtoni	Pouched Frog	V	-	Live in cool, moist rainforest, including Antarctic Beech, or moist eucalypt forest in mountainous areas, mostly above 800m. They spend most of the time in damp leaf litter, or under rocks and rotten logs (DECC, 2008b).	Low
Crinia tinnula	Wallum Froglet	V	-	Found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Litoria aurea	Green and Golden Bell Frog	E	V	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. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas (DECC, 2008b).	Low
Litoria olongburensis	Olongburra Frog	V	V	Usually found amongst sedges and rushes in Paperbark swamps and sedge swamps of the coastal "wallum" country. Wallum is a *Banksia* dominated lowland heath ecosystem characterised by acidic waterbodies (DECC, 2008b).	Low
Mixophyes fleayi	Fleay's Frog	E	E	Rainforest and wet eucalypt forest of the escarpment and foothills, usually close to gravely streams (DECC, 2008b).	Low
Mixophyes iteratus	Giant Barred Frog	E	E	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 (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Philoria loveridgei	Loveridge's Frog	E	-	Dependent on high moisture levels, occurring in the headwaters of small streams and about soaks where ground-water is continually present and close to the surface. Favour subtropical and warm temperate rainforest and wet eucalypt forest, but also occurs in moist eucalypt forest where rocky outcropping creates surface water (DECC, 2008b).	Low
Insects					
Nurus atlas	Atlas Rainforest Ground-beetle	E	-	Low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels (DECC, 2008b).	Low
Nurus brevis	Shorter Rainforest Ground-beetle	E	-	Low elevation rainforest, predominantly drier rainforests. Little is known of its detailed habitat requirements apart from the fact that adults live in burrows (DECC, 2008b).	Low
Phyllodes imperialis	A Moth	E	E	Found in undisturbed subtropical rainforest below 600m. Breeding habitat is restricted to areas where the caterpillar's food plant, a native rainforest vine, *Carronia multisepalea*, grows in a collapsed shrub-like form. Adults require the darkness supplied by the vine and other rainforest vegetation in order to breed (DECC, 2008b).	Low
Mammals					

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Aepyprymnus rufescens	Rufous Bettong	V	-	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. Sleep during the day in cone-shaped nests constructed of grass in a shallow depression at the base of a tussock or fallen log (DECC, 2008b).	Low
Cercartetus nanus	Eastern Pygmy-possum	V	-	Inhabit a broad range of habitats from rainforest through to sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (eg. grass-tree skirts) (DECC, 2008b).	Low
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	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 (DECC, 2008b).	Low
Dasyurus maculatus maculatus	Spotted-tail Quoll	V	E	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 (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Miniopterus australis	Little Bentwing-bat	V	-	Moist eucalypt forest, rainforest or dense coastal Banksia scrub. Roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats (DECC, 2008b).	Low
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas (DECC, 2008b).	Low
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Occur 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 (DECC, 2008b).	Low
Myotis adversus	Large-footed Myotis	V	-	Generally roost in groups of 10 - 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 (DECC, 2008b).	Low
Nyctimene robinsoni	Eastern Tube-nosed Bat	V	-	Favour streamside habitats within coastal subtropical rainforest and moist Eucalypt forests with a well-developed rainforest understorey. Feed mainly on fruit and nectar from trees in the rainforest canopy and sometimes come close to human settlement to visit flowering or fruiting trees (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Nyctophilus bifax	Eastern Long-eared Bat	V	-	Lowland subtropical rainforest and wet swamp Eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark (DECC, 2008b).	Low
Petaurus australis	Yellow-bellied Glider	V	-	Occur in tall mature Eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Den, often in family groups, in hollows of large trees (DECC, 2008b).	Low
Petaurus norfolcensis	Squirrel Glider	V	-	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. Require abundant tree hollows for refuge and nest sites (DECC, 2008b).	Low
Phascolarctos cinereus	Koala	V	-	Inhabit Eucalypt woodlands and forests. Feed on the foliage of more than 70 Eucalypt species and 30 non-Eucalypt species, but in any one area will select preferred browse species (DECC, 2008b).	**Moderate**

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Planigale maculata	Common Planigale	V	-	Inhabit rainforest, Eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. They are active at night and during the day shelter in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks (DECC, 2008b).	Low-Moderate
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V	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 (DECC, 2008b).	Low
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	-	In NSW found in low numbers in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands. Optimal habitat appears to be in vigorously regenerating heathland burnt from 18 months to four years previously (DECC, 2008b).	Low
Pteropus alecto	Black Flying-fox	V	-	Large communal day-time camps in remnants of coastal subtropical rainforest or swamp forest, often with Grey-headed Flying-foxes (DECC, 2008b).	Low-Moderate

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occur 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 (DECC, 2008b).	**Moderate**
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory DECC, 2008b).	Low
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	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 (DECC, 2008b).	Low
Syconycteris australis	Common Blossom-bat	V	-	Roost in littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps (DECC, 2008b).	Low
Thylogale stigmatica	Red-legged Pademelon	V	-	Inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators. In NSW, rarely found outside forested habitat (DECC, 2008b).	Low
Reptiles					

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Cacophis harriettae	White-crowned Snake	V	-	Favours low to mid-elevation dry eucalypt forest and woodland, particularly areas with a varied and well-developed litter layer, where their prey of small lizards may be more abundant. Also occasionally found in moist eucalypt forest and coastal heathland (DECC, 2008b).	Low
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V	V	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. Lives in loose soil, leaf litter and rotting logs, and feeds on earthworms and beetle grubs (DECC, 2008b).	Low
Hoplocephalus stephensii	Stephen's Banded Snake	V	-	Rainforest and Eucalypt forests and rocky areas up to 950m in altitude. Shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day (DECC, 2008b).	Low
Snails/Slugs					
Thersites mitchellae	Mitchell's Rainforest Snail	E	CE	Remnant areas of lowland subtropical rainforest and swamp forest on alluvial soils. Slightly higher ground around the edges of wetlands with palms and fig trees are particularly favoured habitat. Typically found amongst leaf litter on the forest floor, and occasionally under bark in trees. Active at night and feeds on leaf litter, fungi and lichen (DECC, 2008b).	Low
Plants					
Acacia bakeri	Marblewood	V	-	Restricted to coastal south-east Queensland and north-east NSW, where it occurs north from Mullumbimby. Found in or near lowland subtropical rainforest, in adjacent Eucalypt forest and in regrowth of both. Usually occurs in the understorey but may occur as a large canopy tree (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Acalypha eremorum	Acalypha	E	-	In NSW it occurs in only a few localities, including the Chaelundi, Lismore and Burringbar areas. Found in subtropical rainforest, dry rainforest and vine thickets (DECC, 2008b).	Low
Acronychia littoralis	Scented Acronychia	E	E	Grows in littoral rainforest on sand (DECC, 2008b).	Low-Moderate
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	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 (DECC, 2008b).	Low
Amorphospermum whitei	Rusty Plum	V	-	Distributional stronghold is on the mid north coast around Coffs Harbour where it is found in rainforest and the adjacent understorey of moist Eucalypt forest (DECC, 2008b).	**Moderate**
Archidendron hendersonii	White Lace Flower	V	-	Found on a variety of soils including coastal sands and those derived from basalt and metasediments. Occurs in riverine and lowland subtropical rainforest and littoral rainforest (DECC, 2008b).	Low-Moderate
Arthraxon hispidus	Hairy Jointgrass	V	V	Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Baloghia marmorata	Jointed Baloghia	V	V	In NSW, known only from the Lismore district where it is found in subtropical rainforest on soils derived from basalt (DECC, 2008b).	Low
Bosistoa selwynii	Heart-leaved Bonewood	V	V	Occurs from Maryborough in Queensland south to the Tweed River district in north-east NSW where it is found in rainforest up to 300m in altitude on deep asaltic soils. In NSW, it prefers alluvial flats, particularly creek banks (DECC, 2008b).	Low
Bosistoa transversa	Yellow Satinheart	V	V	Occurs from Maryborough in Queensland south to the Nightcap Range north of Lismore in north-east NSW in lowland subtropical rainforest up to 300m in altitude (DECC, 2008b).	Low
Bulbophyllum globuliforme	Miniature Moss-orchid	V	V	Found almost exclusively in the McPherson Range between NSW and Queensland, at altitudes between 300 and 600m. Grows on Hoop Pines (*Araucaria cunninghamii*) in upland subtropical rainforest where it is usually found on the upper trunk and branches of the Hoop Pines which protrude from the general rainforest canopy. The climate in such situations is cool and wet (DECC, 2008b).	Low
Calophanoides hygrophiloides	Native Justicia	E	-	Rarely seen in NSW. Found in the understorey of littoral rainforest, dry rainforest and wet eucalypt forest, usually in well-drained areas (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Chamaesyce psammogeton	Sand Spurge	E	-	Grows on fore-dunes and exposed headlands, often with Spinifex (*Spinifex sericeus*) (DECC, 2008b).	Low
Choricarpia subargentea	Giant Ironwood	E	-	Known in NSW only from Mount Chincogan near Mullumbimby and one recent record at Jiggi north-west of Lismore. Found in dry rainforest regrowth consisting of thickets growing in steeply sloping paddocks on basalt-derived soil (DECC, 2008b).	Low
Clematis fawcettii	Northern Clematis	V	V	Found in north-east NSW north from Lismore in drier rainforest, usually near streams (DECC, 2008b).	Low-Moderate
Corchorus cunninghamii	Native Jute	E	E	Occurs in ecotones between wet eucalypt forest and dry to dry-subtropical rainforest on sheltered slopes and gullies, and grassy, open forest on exposed slopes and ridges (DECC, 2008b).	Low-Moderate
Corokia whiteana	Corokia	V	V	Highly restricted distribution. Inland populations are found at the boundaries between wet eucalypt forest and warm temperate rainforest, at altitudes up to 800 m (DECC, 2008b).	Low
Cryptocarya foetida	Stinking Cryptocarya	V	V	Found in littoral rainforest, usually on sandy soils, but mature trees are also known on basalt soils (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Known from a range of communities, including swamp-heath and woodland. Typically found in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black She-oak (*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*) (DECC, 2008b).	Low
Davidsonia jerseyana	Davidson's Plum	E	E	Lowland subtropical rainforest and wet eucalypt forest at low altitudes (below 300m). Many trees are isolated in paddocks and on roadsides in former rainforest habitats (DECC, 2008b).	Low-Moderate
Davidsonia johnsonii	Smooth Davidson's Plum	E	E	Lowland subtropical rainforest and wet eucalypt forest at low altitudes (below 300m). Many trees are isolated in paddocks and on roadsides in cleared land (DECC, 2008b).	Low-Moderate
Desmodium acanthocladum	Thorny Pea	V	V	Dry rainforest and fringes of riverine subtropical rainforest. On basalt-derived soils at low elevations. Much of its habitat has been cleared for agriculture (DECC, 2008b).	Low-Moderate
Diospyros mabacea	Red-fruited Ebony	E	E	Usually grows as an understorey tree in lowland subtropical rainforest, often close to rivers. Soils are generally basalt-derived or alluvial (DECC, 2008b)	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Diploglottis campbellii	Small-leaved Tamarind	E	E	Confined to the warm subtropical rainforests of the NSW-Queensland border lowlands and adjacent low ranges. Forest types vary from lowland subtropical rainforest to drier subtropical rainforest with a Brush Box open overstorey. Occurs on basalt-derived soils and also on poorer soils such as those derived from quartz monzonite (DECC, 2008b).	Low
Diuris sp. aff. chrysantha	Byron Bay Diuris	E	-	Known from a single location only, at Byron Bay in north-east NSW. Occurs in low-growing grassy heath on clay soil (DECC, 2008b).	Low
Doryanthes palmeri	Giant Spear Lily	V	-	Occurs on exposed rocky outcrops on infertile soils or on bare rock. Grows in a narrow band of vegetation along the cliff-tops and on steep cliff-faces or rocky ledges in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest (DECC, 2008b).	Low
Drynaria rigidula	Basket Fern	E	-	Grows on plants, rocks or on the ground. Usually found in rainforest but also in moist eucalypt and Swamp Oak forest (DECC, 2008b).	Low-Moderate
Elaeocarpus sp. Rocky Creek	Minyon Quandong	E	E	Warm temperate or subtropical rainforest and where rainforest and wet eucalypt forest meet. Often associated with Brush Box (DECC, 2008b).	Low
Elaeocarpus williamsianus	Hairy Quandong	E	E	Subtropical to warm temperate rainforest, including regrowth areas where it has apparently regrown from root suckers after clearing. Soils are derived from metasediments (DECC, 2008b).	Low-Moderate

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Endiandra floydii	Crystal Creek Walnut	E	E	Warm temperate or subtropical rainforest with Brush Box overstorey, and in regrowth rainforest and Camphor Laurel forest (DECC, 2008b).	Low-Moderate
Endiandra hayesii	Rusty Rose Walnut	V	V	Sheltered moist gullies in lowland subtropical and warm temperate rainforest on alluvium or basaltic soils (DECC, 2008b).	Low
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	E	-	Subtropical rainforest or wet eucalypt forest, chiefly at lower altitudes (DECC, 2008b).	**Moderate**
Floydia praealta	Ball Nut	V	V	Riverine and subtropical rainforest, usually on soils derived from basalt (DECC, 2008b).	Low
Fontainea australis	Southern Fontainea	V	V	Found in lowland subtropical rainforest, usually on basaltic alluvial flats, and also in cooler subtropical rainforest in the Nightcap Range (DECC, 2008b).	Low
Fontainea oraria	Coastal Fontainea	E	E	Extremely rare, restricted to a small number of trees at Lennox Head in north-east NSW. Occurs in remnant regrowth littoral rainforest on highly fertile red-brown krasnozem soils derived from the basalt. Found on stony slopes within 1km of the sea and at about 50m above sea level (DECC, 2008b).	Low
Geijera paniculata	Axe-breaker	E	-	Very rare in north-east NSW, where it is known from the Tweed, Lismore and Wardell areas. Found in dry subtropical rainforest and vine scrub, often along rivers (DECC, 2008b).	Low
Geodorum densiflorum	Pink Nodding Orchid	E	-	Dry eucalypt forest and coastal swamp forest at lower altitudes, often on sand (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Gossia fragrantissima	Sweet Myrtle	E	E	Mostly found on basalt-derived soils in dry subtropical and riverine rainforest. As it can coppice from roots left in the ground when rainforest is cleared, it is found at several sites as isolated plants in paddocks or regrowth (DECC, 2008b).	Low-Moderate
Grevillea hilliana	White Silky Oak	E	-	Grows in subtropical rainforest, often on basalt-derived soils (DECC, 2008b).	Low
Hibbertia hexandra	Tree Guinea Flower	E	-	Typically grows in heath, open forest or rainforest (DECC,2008b).	Low
Hicksbeachia pinnatifolia	Red Bopple Nut	V	V	Coastal areas of north-east NSW in subtropical rainforest, moist eucalypt forest and Brush Box forest (DECC, 2008b).	Low-Moderate
Isoglossa eranthemoides	Isoglossa	E	E	Very restricted distribution in north-east NSW. Found in the understorey of lowland subtropical rainforest, in moist situations on floodplains and slopes. Underlying soils are derived from basalt, metasediments or gabbro (DECC, 2008b).	Low
Macadamia tetraphylla	Rough-shelled Bush Nut	V	V	Found in subtropical rainforest, usually near the coast (DECC, 2008b).	Low-Moderate
Marsdenia longiloba	Slender Marsdenia	E	V	Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops (DECC, 2008b).	Low-Moderate
Melicope vitiflora	Coast Euodia	E		Grows in subtropical and littoral rainforest (DECC, 2008b).	Low
Ochrosia moorei	Southern Ochrosia	E	E	Found in riverine and lowland subtropical rainforest (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Owenia cepiodora	Onion Cedar	V	V	Subtropical and dry rainforest on or near soils derived from basalt (DECC, 2008b).	Low-Moderate
Ozothamnus vagans	-	-	V	Rare. Grows in and around rainforest in the McPherson Ranges and on Mt Warning (RBG, 2008b).	Low
Peristeranthus hillii	Brown Fairy-chain Orchid	V	-	Restricted to coastal and near-coastal environments, particularly Littoral Rainforest and the threatened ecological community Lowland Rainforest on Floodplain. Where it grows in clumps on tree trunks and thick vines (DECC, 2008b).	Low
Phaius australis	Southern Swamp Orchid	E	E	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas (DECC, 2008b).	Low-Moderate
Phaius tankervilleae	Lady Tankarville's Swamp Orchid	E	E	Found in swampy grassland or swampy forest, including rainforest, eucalypt and paperbark forest (DECC, 2008b).	Low-Moderate
Phyllanthus microcladus	Brush Sauropus	E	-	Usually found on banks of creeks and rivers, in streamside rainforest (DECC, 2008b).	Low
Plectranthus nitidus	Nightcap Plectranthus	E	E	Grows on rocky cliff-faces and boulders, in the shelter and shade provided by the adjacent rainforest. Co-occurs with *Plectranthus graveolens* and Crofton Weed (DECC, 2008b).	Low
Pterostylis nigricans	Dark Greenwood	V	-	Coastal heathland with Heath Banksia (*Banksia ericifolia*) and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Randia moorei	Spiny Gardenia	E	E	Sparsely distributed, with most records in the Tweed and Brunswick areas. Subtropical, riverine, littoral and dry rainforest. In NSW, Hoop Pine and Brush Box are common canopy species (DECC, 2008b).	Low-Moderate
Rapanea sp. Richmond River	Ripple-leaf Muttonwood	E	E	Subtropical and dry rainforest and swamp forest on creek flats and slopes on basalt derived soil (DECC, 2008b).	Low-Moderate
Sarcochilus dilatatus	Brown Butterfly Orchid	E	-	Very rare in NSW. Grows on trees in littoral rainforest, subtropical rainforest, dry rainforest and streamside forests, mainly at low to medium (up to 500m) altitudes. Favours Hoop Pine as a host (DECC, 2008b).	Low-Moderate
Sarcochilus fitzgeraldii	Ravine Orchid	V	V	Grows mainly on rocks, amongst organic matter, in cool, moist, shady ravines, gorges and on cliff faces in dense subtropical rainforest at altitudes between 500 and 700m. Occasional clumps are found on the bases of fibrous-barked trees (DECC, 2008b).	Low
Sarcochilus hartmannii	Hartman's Sarcochilus	V	V	Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees (DECC, 2008b).	Low
Senna acclinis	Rainforest Cassia	E	-	Grows in or on the edges of subtropical and dry rainforest (DECC, 2008b).	Low-Moderate
Sophora fraseri	Brush Sophora	V	V	North from the Casino district in north-east NSW, where it is very rare. Usually found in moist situations, often near rainforest (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Symplocos baeuerlenii	Small-leaved Hazelwood	V	V	Warm temperate rainforest on less fertile soils derived from rhyolite (DECC, 2008b).	Low
Syzygium hodgkinsoniae	Red Lilly Pilly	V	V	Usually found in riverine and subtropical rainforest on rich alluvial or basaltic soils (DECC, 2008b).	**Moderate-High**
Syzygium moorei	Durobby	V	V	Found in subtropical and riverine rainforest at low altitude. Often occurs as isolated remnant paddock trees (DECC, 2008b).	**Moderate**
Syzygium paniculatum	Magenta Lilly Pilly	V	V	Occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities (DECC, 2008b).	Low
Taeniophyllum muelleri	Minute Orchid	-	V	Grows on outer branches and branchlets of rainforest trees. Occurs on the coast and coastal ranges of NSW from sea level to 250m altitude, north from the Bellinger River (RBG, 2008).	Low
Tarenna cameronii	Cameron's Tarenna	E	-	In NSW only one very small population is known in Lismore. Found in the understorey of dry rainforest, on rocky basalt-derived soils (DECC, 2008b).	Low
Thesium australe	Austral Toadflax	V	V	Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*) (DECC, 2008b).	Low

Scientific Name	Common Name	Legal Status		Habitat Requirements	Likelihood of Occurrence
		TSC Act	EPBC Act		
Tinospora smilacina	Tinospora Vine	E	-	North from the Coffs Harbour district in north-east NSW, where it is rare. Found in dry rainforest and along the boundaries of dry rainforest and dry eucalypt forest (DECC, 2008b).	Low-Moderate
Tinospora tinosporoides	Arrow-head Vine	V	V	Wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils (DECC, 2008b).	**Moderate-High**
Uromyrtus australis	Peach Myrtle	E	E	Warm temperate rainforest on less fertile soils derived from rhyolite rock. Often associated with Coachwood (*Ceratopetalum apetalum*) (DECC, 2008b).	Low
Xylosma terrae-reginae	Queensland Xylosma	E	-	Rare in restricted habitat in NSW. Littoral and subtropical rainforest on coastal sands or soils derived from metasediments (DECC, 2008b).	Low

V= Vulnerable
E = Endangered
CE = Critically Endangered

Annex C

Assessments of Significance

C1 Black-necked Stork (E TSC Act)	
(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 Black-necked Stork inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters and adjacent grasslands and savannah woodlands (DECC, 2008b). Nests are made in a live or dead tree in or near a freshwater swamp (DECC, 2008b). This species can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries (DECC, 2008b). The Black-necked Stork was not recorded during field investigations although previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a). The proposed route occurs adjacent to freshwater *SEPP 14* coastal wetlands within the localities of Ewingsdale and Newrybar (refer *Figure 6.2*) which may potentially provide suitable foraging, sheltering and breeding habitat for this species. In these areas, the proposed upgrade will occur within existing easements located adjacent to SEPP 14 areas and will not require the removal of vegetation or disturbance to these communities. Estuarine *SEPP 14* coastal wetland areas located adjacent to Fishery Creek and Emigrant Creek within the West Ballina locality (refer *Figure 6.3*) potentially provide suitable foraging habitat for this species. The proposed electricity network route spans Fishery Creek and Emigrant Creek. In these areas the proposed upgrade will occur within existing easements and will not require vegetation removal although some trimming of vegetation as part of existing routine maintenance may be required. Overall, the potential for disturbance to these areas will be minimal, particularly with the adoption of mitigation measures outlined in *Section 8*. Consequently, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population 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
	Potential foraging, sheltering and breeding habitat provided by freshwater *SEPP 14* coastal wetlands within the Ewingsdale and Newrybar localities will not be removed or modified as a result of the proposed electricity route upgrade. In these areas the proposed route occurs adjacent to the *SEPP 14* areas within

existing electricity easements.

Potential foraging habitat provided by estuarine *SEPP 14* coastal wetland areas adjacent to Fishery Creek and Emigrant Creek will not be removed as a result of the proposal. In these areas, the proposed upgrade will occur within existing easements currently spanning the creeks. No vegetation will be removed though some trimming of vegetation and pole replacement may be required. All works proposed will be conducted in accordance with mitigation measures outlined in *Section 8* to ensure minimal environmental impact.

(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

In areas of potential habitat, the proposed electricity route upgrade will occur within existing easements and will not result in the isolation or fragmentation of these areas.

(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,

Whilst the *SEPP 14* coastal wetland areas adjacent to Fishery Creek and Emigrant Creek have the potential to provide suitable foraging habitat for the Black-necked Stork it is unlikely that these areas provide suitable breeding or sheltering habitat given that it is an estuarine rather than freshwater environment. This species may occasionally use the area as a foraging resource though it is unlikely to be of significant importance to the long term survival of this species.

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

Critical habitat has not been declared for the Black-necked Stork.

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

There is currently no Recovery Plan or threat abatement plan for the Black-necked Stork.

(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C2 Black Bittern (V TSC Act)	
(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 Black Bittern inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation including flooded grassland, forest, woodland, rainforest and mangroves (DECC, 2008b). Nests consisting of a bed of sticks and reeds are located on a branch overhanging water (DECC, 2008b). The Black Bittern was not recorded during field investigations although previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a). Freshwater *SEPP 14* coastal wetlands within the localities of Ewingsdale and Newrybar and estuarine *SEPP 14* coastal wetlands within the West Ballina locality that occur near the proposed electricity network route (refer *Figure 6.3*) have the potential to provide suitable foraging, sheltering and breeding habitat for this species. As discussed in *Table C1*, the proposed upgrade will occur within existing easements and will not require vegetation removal in these areas. The potential for disturbance is minimal, particularly with the adoption of mitigation measures outlined in *Section 8*. Consequently, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population 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.

C2 Black Bittern (V TSC Act)	
(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
	Potential foraging, sheltering and breeding habitat provided by freshwater *SEPP 14* coastal wetlands within the Ewingsdale and Newrybar localities will not be removed or modified as a result of the proposed electricity route upgrade. In these areas the proposed route occurs adjacent to the *SEPP 14* areas within existing electricity easements. Potential foraging, sheltering and breeding habitat provided by estuarine *SEPP 14* coastal wetland areas adjacent to Fishery Creek and Emigrant Creek will not be removed as a result of the proposal. In these areas, the proposed upgrade will occur within existing easements currently spanning the creeks. No vegetation will be removed though some trimming of vegetation and pole replacement may be required. All works proposed will be conducted in accordance with mitigation measures outlined in *Section 8* to ensure minimal environmental impact.
	(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
	In areas of potential habitat, the proposed electricity route upgrade will occur within existing easements and will not result in the isolation or fragmentation of these areas.
	(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,
	Whilst the *SEPP 14* coastal wetland areas adjacent to Fishery Creek and Emigrant Creek have the potential to provide suitable foraging, sheltering or breeding habitat for the Black Bittern, this species was not observed during field investigations.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Black Bittern.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for the Black Bittern.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C3 Osprey (V TSC Act)	
(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 Osprey favours coastal areas, especially the mouths of large rivers, lagoons and lakes and nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea (DECC, 2008b). The Osprey was not recorded during field investigations although a man-made nest was identified in the area where the proposed electricity network route spans Emigrant Creek (refer *Figure 6.3*) and previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a). In the area containing the man-made nest, the proposed route will occur within the existing easement and will not require vegetation removal or disturbance to the man-made nest. Additionally, works within the vicinity of the nest will not be conducted during the breeding season (June to August). Any potential environmental disturbance resulting from the proposal will be minimal and is unlikely to disrupt the life cycle of this species such that a viable local population 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 man-made Osprey nest identified in the area where the proposed electricity network route spans Emigrant Creek will not be removed or modified as a result of the proposal.
	(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
	Within the vicinity of the man-made Osprey nest, the proposed electricity route upgrade will occur within existing easements and will not result in the isolation or fragmentation of any areas of habitat.

C3 Osprey (V TSC Act)	
	(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,
	No known Osprey habitat will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Osprey.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for the Osprey.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C4 Grass Owl (V TSC Act)	
(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,*
	Grass Owls are ground-dwelling birds found in areas of tall grass including grass tussocks in swampy areas, grassy plains, swampy heath and cane grass, or sedges on flooplains where they rest by day in a large tussock or other heavy growth (DECC, 2008b). The Grass Owl was not recorded during field investigations although previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a). A number of areas adjacent to the proposed route have the potential to provide suitable foraging, sheltering and breeding habitat for the Grass Owl, particularly the area to the east of Teven Road in West Ballina, the area between the Pacific Highway and Gallans Road in Cumbalum and the area between Newrybar Swamp Road and Midgen Flat Road in Newrybar (refer *Figure 6.2*). These areas contain tall grass and cane fields and are located in swampy areas. Although the proposed electricity network route bisects a number of grassy paddocks the presence of cattle in many of these paddocks precludes the likelihood of suitable habitat. Within the West Ballina and Newrybar areas, the proposed electricity network route will occur within the existing cleared easement and will not require vegetation removal. Access to these areas will be via existing service routes. Any potential environmental disturbance will be minimal and short term and unlikely to disrupt the life cycle of this species such that a viable population would be placed at risk of extinction.

C4 Grass Owl (V TSC Act)	
(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
	Potential Grass Owl habitat identified within the West Ballina and Newrybar areas will not be removed or modified as a result of the proposal.
	(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
	In areas of potential habitat, the proposed electricity route upgrade will occur within existing easements and will not result in the isolation or fragmentation of any areas of habitat.
	(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,
	No known Grass Owl habitat will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Grass Owl.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for the Grass Owl.

C4 Grass Owl (V TSC Act)

(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C5 Koala (V TSC Act)

(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,

Koalas inhabit Eucalypt woodlands and forests and feed on more than 70 Eucalypt species and 30 non-Eucalypt species, but in any one area will select preferred browse species (DECC, 2008b).

The Koala or signs of their presence were not recorded during field investigations although a number of previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a).

Assessment of the proposed route in accordance with *SEPP 44 – Koala Habitat* (refer *Section 8*) showed that although some Koala feed trees as listed under Schedule 2 were identified within areas of the proposed electricity line route, the isolated and fragmented nature of these trees and the absence of other signs of inhabitation, reveal that the Project Area is not '*core'* Koala habitat as defined by the Policy.

However, given the vast area covered by the proposed electricity network route, it is possible that Koalas in the area may traverse the area and browse on these isolated trees as part of their home range.

The majority of the proposed electricity network route upgrade will occur within existing electricity easements and access will be via existing service routes. Vegetation removal/disturbance will be minimal and short term and unlikely to disrupt the life cycle of this species such that a viable population 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.

C5 Koala (V TSC Act)	
	(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 majority of the proposed electricity network route will occur within existing electricity easements and vegetation removal will not be required. The proposed deviation from the existing easement along Rayward's Lane within the Skinner's Shoot area was found to contain a number of Tallowwood (*Eucalyptus microcorys*) trees which are listed as Koala feed trees under Schedule 2 of *SEPP 44*. The Project Area was not identified as *'core'* Koala habitat as defined under the Policy. The proposed underground installation of electricity supply lines within the cleared area of Rayward's Lane and the adoption of mitigation measures outlined in *Section 8* will minimise the potential environmental impacts associated with the proposed deviation and reduce the risk of root damage to nearby trees.
	(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 majority of the proposed electricity network route upgrade will occur within existing easements and will not result in the isolation or fragmentation of any areas of habitat. In the Skinner's Shoot area, the proposed underground installation of the electricity supply line along the cleared area of Rayward's Lane will reduce the likelihood of any areas of potential habitat becoming fragmented or isolated as a result of the proposal.
	(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,
	Whilst the vegetation adjacent to Rayward's Lane was found to contain Tallowwood trees, assessment under *SEPP 44* revealed that the Project Area was not considered to be *'core'* Koala habitat and it is unlikely that this habitat is of significant importance to the long term survival of this species.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared 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 this species (DECC, 2003). The objectives of this plan are in accordance with *SEPP 44*. The proposed development has been assessed using *SEPP 44* (refer *Section 8*).
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C6 Grey-headed Flying-fox (V TSC Act; V EPBC Act)	
(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 occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (DECC, 2008b). Roosting camps are generally located within 20km of a regular food source (e.g. *Eucalyptus*, *Melaleuca*, *Banksia* and rainforest trees) and are commonly found in gullies, close to water, in vegetation with a dense canopy (DECC, 2008b). The Grey-headed Flying-fox was not recorded during field investigations although previous records have been identified within close proximity to the proposed electricity network route (DECC, 2008a). Areas of moist sclerophyll adjacent to the proposed route have the potential to provide suitable foraging habitat for this species, particularly in the Skinner's Shoot area. The majority of the proposed electricity network route upgrade will occur within existing electricity easements and access will be via existing service routes. Within the Skinner's Shoot area, the underground installation of the electricity supply line along the cleared area of Rayward's Lane will result in minimal vegetation disturbance and will be unlikely to disrupt the life cycle of this species such that a viable population 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 majority of the proposed electricity network route will occur within existing electricity easements and vegetation removal will not be required. The proposed underground installation of electricity supply lines within the cleared area of Rayward's Lane and the adoption of mitigation measures outlined in *Section 8* will minimise the potential environmental impacts associated with the proposed deviation and reduce the risk of root damage to nearby trees.
	(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

C6 Grey-headed Flying-fox (V TSC Act; V EPBC Act)

The majority of the proposed electricity network route upgrade will occur within existing easements and will not result in the isolation or fragmentation of any areas of habitat. In the Skinner's Shoot area, the proposed underground installation of the electricity supply line along the cleared area of Rayward's Lane will reduce the likelihood of any areas of potential habitat becoming fragmented or isolated as a result of the proposal.

(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,

Whilst moist sclerophyll vegetation adjacent to the proposed electricity network route potentially provides suitable foraging habitat for the Grey-headed Flying-fox, the lack of a suitable water source in these areas precludes the Project Area from containing potential roosting habitat and consequently it is unlikely that this habitat is of significant importance to the long term survival of this species.

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

Critical habitat has not been declared 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,

There is currently no Recovery Plan or threat abatement plan for 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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C7 Rusty Plum (V TSC Act)

(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,

Rusty Plum occurs in the coast and adjacent ranges of northern NSW within rainforest and the adjacent understorey of moist eucalypt forest (DECC, 2008b).

Previous records of this species have been identified within close proximity of the proposed electricity network route (DECC, 2008a) and potential habitat for this species has been identified in the area of vegetation to the north of Midgen Flat and to the east of Broken Head Road (refer *Figure 6.2*) This species was not observed during field investigations.

Within this area, the proposed electricity network route upgrade will occur within the existing cleared electricity easement and access will be via existing service routes. The potential disturbance will be minimal and will be unlikely to disrupt the life cycle of this species such that a viable population 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,

C7 Rusty Plum (V TSC Act)	
	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
	Within the area identified as potential habitat for this species, the proposed electricity network route upgrade will occur within existing cleared electricity easement and vegetation removal or modification will not be required.
	(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
	As the proposed electricity network route upgrade will occur within the existing cleared electricity easement, the area identified as potential habitat is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposal.
	(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,
	No known areas of habitat for this species will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Rusty Plum.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for the Rusty Plum.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C8 Green-leaved Rose Walnut (E TSC Act;)	
(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,*
	Green-leaved Rose Walnut occurs in Queensland and in north-east NSW within subtropical rainforest or wet eucalypt forest, chiefly at lower altitudes (DECC, 2008b). Previous records of this species have been identified within close proximity of the proposed electricity network route (DECC, 2008a) and potential habitat for this species has been identified in the area of vegetation to the north of Midgen Flat and to the east of Broken Head Road (refer *Figure 6.2*). This species was not observed during field investigations. Within this area, the proposed electricity network route upgrade will occur within the existing cleared electricity easement and access will be via existing service routes. The potential disturbance will be minimal and will be unlikely to disrupt the life cycle of this species such that a viable population 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
	Within the area identified as potential habitat for this species, the proposed electricity network route upgrade will occur within existing cleared electricity easement and vegetation removal or modification will not be required.
	(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
	As the proposed electricity network route upgrade will occur within the existing cleared electricity easement, the area identified as potential habitat is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposal.

C8 Green-leaved Rose Walnut (E TSC Act;)	
	(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,
	No known areas of habitat for this species will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Green-leaved Rose Walnut.
(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 this species (DECC, 2004). The proposed electricity network upgrade is not in opposition to the objectives of this plan.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C9 Red Lilly Pilly (V TSC Act; V EPBC Act)	
(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 Red Lilly Pilly has a restricted range from the Richmond River in north-east NSW to Gympie in Queensland and is usually found in riverine and subtropical rainforest on rich alluvial or basaltic soils (DECC, 2008b). Previous records of this species have been identified within close proximity of the proposed electricity network route (DECC, 2008a) and potential habitat for this species has been identified in the area of vegetation to the south of the Skinners Shoot Road and Yagers Lane road junction (refer *Figure 6.2*). Plant specimens collected by Country Energy personnel in this area revealed the presence of a Lilly Pilly species which may be Red Lilly Pilly although the lack of identifying features makes this difficult to determine. The proposed electricity network route upgrade will occur within the existing easement to the north east of this area of potential habitat, within the road reserve of Yagers Lane before heading west along Rayward's Lane. With the implementation of mitigation measures outlined in *Section 8*, the potential for disturbance will be minimal and is unlikely to disrupt the life cycle of this species such that a viable population 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,*

C9 Red Lilly Pilly (V TSC Act; V EPBC Act)	
	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 proposed electricity network route upgrade will occur within the existing easement to the north east of the area identified as potential habitat for this species, within the road reserve of Yagers Lane. Consequently, the proposal will not require the removal or modification of the area identified as potential habitat.
	(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
	As the proposed electricity network route upgrade will occur within the existing electricity easement to the north east of the area identified as potential habitat it is unlikely that this area will become fragmented or isolated from other areas of habitat as a result of the proposal.
	(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,
	No known areas of habitat for this species will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for the Red Lilly Pilly.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for the Red Lilly Pilly.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C10 Durobby (V TSC Act; V EPBC Act)

C10 Durobby (V TSC Act; V EPBC Act)	
(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,*
	Durobby is found in the Richmond, Tweed and Brunswick River valleys in north-east NSW in subtropical and riverine rainforest at low altitude and often occurs as isolated remnant paddock trees (DECC, 2008b). Previous records of this species have been identified within close proximity of the proposed electricity network route (DECC, 2008a) and potential habitat for this species has been identified in the area of vegetation to the north of Midgen Flat and to the east of Broken Head Road (refer *Figure 6.2*), however this species was not identified during field investigations. Within this area, the proposed electricity network route upgrade will occur within the existing cleared electricity easement and access will be via existing service routes. The potential disturbance will be minimal and will be unlikely to disrupt the life cycle of this species such that a viable population 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
	Within the area identified as potential habitat for this species, the proposed electricity network route upgrade will occur within existing cleared electricity easement and vegetation removal or modification will not be required.
	(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
	As the proposed electricity network route upgrade will occur within the existing cleared electricity easement, the area identified as potential habitat is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposal.

C10 Durobby (V TSC Act; V EPBC Act)	
	(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,
	No known areas of habitat for this species will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for Durobby.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for Durobby.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C11 Arrow-head Vine (V TSC Act; V EPBC Act)	
(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,*
	Arrow-head Vine occurs north from the Richmond River in north-east NSW within wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils (DECC, 2008b). Previous records of this species have been identified within close proximity of the proposed electricity network route (DECC, 2008a) and this species was identified in the area of vegetation to the south of the Skinners Shoot Road and Yagers Lane road junction (refer *Figure 6.2*). The proposed electricity network route upgrade will occur within the existing easement to the north east of this area of potential habitat, within the road reserve of Yagers Lane before heading west along Rayward's Lane. With the implementation of mitigation measures outlined in *Section 8*, the potential for disturbance will be minimal and is unlikely to disrupt the life cycle of this species such that a viable population 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

C11 Arrow-head Vine (V TSC Act; V EPBC Act)	
	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 proposed electricity network route upgrade will occur within the existing easement to the north east of the area identified as habitat for this species, within the road reserve of Yagers Lane. Consequently, the proposal will not require the removal or modification of the area identified as habitat.
	(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
	As the proposed electricity network route upgrade will occur within the existing electricity easement to the north east of the area identified as habitat it is unlikely that this area will become fragmented or isolated from other areas of habitat as a result of the proposal.
	(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,
	No known areas of habitat for this species will be removed, modified, fragmented or isolated as a result of the proposal.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for Arrow-head Vine.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for Arrow-head Vine.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C12 Swamp Oak Floodplain Forest (Endangered Ecological Community TSC Act)	
(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,*

C12 Swamp Oak Floodplain Forest (Endangered Ecological Community TSC Act)	
	Not applicable.
(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
	The location of areas identified as Swamp Oak Forest within the Project Area are shown on *Figure 6.1.* An area of Swamp Oak Forest is identified to the west of Barlows Road in the West Ballina locality. In this area, the proposed electricity network route upgrade will occur within an existing electricity easement and access to existing poles in the event of pole replacement will be via existing routes. With the implementation of mitigation measures outlined in *Section 8*, the risk of potential impact to this community will be minimal and unlikely to place this community at risk of extinction.
	(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,
	Given that an existing easement is already in place in this area, it is considered unlikely that this community will be substantially or adversely modified such that it local occurrence is likely to be placed at risk of extinction. Regardless, mitigation measures as outlined in *Section 8* (particularly in relation to sediment and erosion control) must be implemented during the proposed upgrade to further reduce the risk of potential impact.
(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
	An existing electricity easement occurs within the area of vegetation identified as Swamp Oak Forest. Upgrade of this electricity supply line to 132kV will require minimal additional work and is unlikely to significantly modify this community. Access to the existing easement will be via existing service points. Any trimming of vegetation during the proposed upgrade will be minimal and vegetation removal will not be undertaken.
	(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
	Within the area identified as Swamp Oak Forest, the proposed upgrade will occur within the existing electricity easement. As such, it is unlikely that this community will not become isolated or fragmented from other areas of habitat as a result of the proposal.

C12 Swamp Oak Floodplain Forest (Endangered Ecological Community TSC Act)	
	(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,
	The risk of potential impact to this community will be minimal and is unlikely to affect the long-term survival of this community within the locality.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for Swamp Oak Floodplain Forest.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for Swamp Oak Floodplain Forest.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act*.

C13 Swamp Sclerophyll Forest on Coastal Floodplains (Endangered Ecological Community TSC Act)	
(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,*
	Not applicable.
(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
	The location of areas identified as Swamp Sclerophyll Forest within the Project Area are shown on *Figure 6.1.* Areas identified as Swamp Sclerophyll Forest within the Project Area occur adjacent to the proposed electricity network route upgrade which will occur within an existing electricity easement and vegetation will not be removed as a result of the proposal. Mitigation measures in relation to sedimentation and weed control will be implemented as part of the proposal to reduce the risk of indirect impacts to this EEC as a result of the proposal.

C13 Swamp Sclerophyll Forest on Coastal Floodplains (Endangered Ecological Community TSC Act)	
	(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,
	No areas of Swamp Sclerophyll Forest will be removed as a result of the proposal. With the implementation of mitigation measures (refer *Section 8*), it is considered unlikely that this community will be substantially or adversely modified such that it local occurrence is likely to be placed at risk of extinction.
(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
	An existing electricity easement occurs within the areas adjacent to identified Swamp Sclerophyll Forest communities. Upgrade of this electricity supply line to 132kV will require minimal additional work and will not require removal or modification of this community. Access to the existing easement will be via existing service points.
	(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 proposed upgrade will occur within an existing electricity easement adjacent to areas identified as Swamp Sclerophyll Forest and will not result in habitat of this community becoming isolated or fragmented from other areas of habitat.
	(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,
	With the implementation of mitigation measures (refer *Section 8*), the risk of potential impact to this community will be minimal and unlikely to affect the long-term survival of this community within the locality.
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*
	Critical habitat has not been declared for Swamp Sclerophyll Forest on Coastal Floodplains.
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*
	There is currently no Recovery Plan or threat abatement plan for Swamp Sclerophyll Forest on Coastal Floodplains.
(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 proposal would not result in the operation of, or increase the impact of, a key threatening process as listed under the *TSC Act.*