Annex B

Constraints Assessment

B.1 INTRODUCTION

This section outlines the environmental constraints within the selected study area. The constraints were determined through desk-based research as well as site inspections. The purpose of the site inspection was to identify the presence of native vegetation and the likelihood of fauna habitat within the study area, confirm potential heritage significance, land use, infrastructure, topography and identify potential social concerns, such as sensitive receivers.

The aim of identifying the environmental constraints is to ascertain suitable and appropriate corridors for the proposed 132kV and/or 66kV sub-transmission lines. Subsequent to this preliminary environmental assessment, the design and buildability from an engineering perspective underpins the selection of potential corridors.

B.1.1 Proposed Line Route Options

ERM have identified potential 132kV and 66kV line route options including a number of sub-options aimed at avoiding areas of potential high impact. The line routes are presented on *Figure 2.1 to 2.6*. The line routes are also presented in detail on the constraint *Figures 1(A to F) to 6(A to F) Annex A,* and are divided into sections between alphanumerical node points (i.e. *A through J*) for ease of identification in constraints assessment as follows:

Section 1 – Mullumbimby to Ewingsdale 132kV

Section 2 – Ewingsdale to Suffolk Park 132kV

Section 3 – Suffolk Park to Lennox Head 132kV

Section 4 – Lenox Head to Alstonville Via Ballina 132kV

Section 5 – Alstonville to Lismore 132kV

Section 6 – Alstonville to Lismore 132kV, Lismore to Lismore South 66kV and Lismore to Lismore University Switching Station 66kV

B.2 PLANNING AND LAND USE CONSIDERATIONS

B.2.1 Land Use

There are a large variety of land uses in the vicinity of the proposed line routes including: residential areas, commercial area, rural residential areas, rural areas, educational establishments (university), an airport (Lismore); and parks/ recreation areas.

B.2.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relates to the protection of the environment and the conservation of biodiversity. The EPBC Act incorporates an assessment and approvals system for:

- actions that have a significant impact on matters of national environmental significance (NES);
- actions that have a significant impact on the environment of Commonwealth land; and
- actions carried out by the Commonwealth Government.

Matters of National Environmental Significance (NES)

Matters of NES under the EPBC Act include:

- World Heritage Areas;
- wetlands protected by international treaty (The RAMSAR Convention);
- nationally listed threatened species and communities;
- nationally listed migratory species (i.e. those species listed by International conventions to which Australia is a signatory);
- all nuclear actions; and
- the environment of Commonwealth marine areas.

The NES matters in relation to the study area and proposed development are addressed in *Table B.2 below*.

Table B.2 ***Relationship of the Project to Matters of National Environmental Significance***

Matter of National Environmental Significance	Application to the Project	Relevant Section
World Heritage Areas	The Nightcap National Park is located approximately 9.5 kilometres west of the Mullumbimby Power Station. The proposed works will not impact on this national park.	Not Applicable
Wetlands protected by international treaty (the RAMSAR Convention)	The study area does not encroach upon any wetlands protected by international treaty. The nearest wetland is Little Llangothlin Lagoon located approximately 250km south west of Lismore.	Not Applicable
Nationally listed threatened species and ecological communities	The proposed development is not expected to impact upon any nationally listed threatened species or ecological communities. A detailed ecological assessment should be undertaken once the preferred route option is selected.	Not applicable at this stage.
Nationally listed migratory species	The proposed development is not expected to impact upon any nationally listed migratory species. A detailed ecological assessment should be undertaken once the preferred route option is selected.	Not applicable at this stage.
All nuclear actions	Not relevant to this project	Not Applicable
The environment of Commonwealth Marine Areas	There are no Commonwealth Marine areas in close proximity to the subject site. The closest is the Solitary Islands Marine Reserve located approximately 130km to the south east of the study area.	Not Applicable

Implications for the project:

The proposed works are not expected to significantly impact on any matter of NES and therefore do not require Commonwealth approval under the provisions of the EPBC Act.

B.2.3 Environmental Planning and Assessment Act 1979

The relevant State planning legislation for NSW is the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act instituted a system of environmental planning and assessment in NSW and is administered by the Department of Planning (DoP).

The EP&A Act is supplemented by a suite of Environmental Planning Instruments (EPIs), namely Local Environmental Plans (LEPs), Regional Environmental Plans (REPs) and State Environmental Planning Policies (SEPPs). The Act identifies three alternative paths under which developments may be considered.

Part 4 applies to projects that require development consent and sets out the matters for consideration by the consent authority (usually the local Council). Part 5 applies to infrastructure projects that do not require development consent and sets out a process for assessing whether or not the project is likely to have a significant impact. Where a significant impact is identified, an EIS is required to be prepared and considered by the determining authority.

Part 3A was introduced in 2005. There are a number of avenues by which an infrastructure project may be identified as a Part 3A project:

- where a State Government infrastructure project is likely to have a significant impact and trigger an EIS under Part 5;
- where declared as a state or regional site by the Minister for Planning. A site may be declared as a state significant site if it meets one or more of a number of criteria. These include the following criteria that may relate to transmission line projects:
- site identified in a state or regional strategy;
- site important for service delivery for a particular industry; and
- alternative arrangements are required to give a project added transparency or where more than one council is affected.

In agreeing that Part 3A applies to State Government infrastructure projects, which are likely to have a significant environmental impact, the Minister may declare that the whole project (including those parts requiring DA's) is a project to which Part 3A applies. The objective of Part 3A is to provide a streamlined planning process and it removes the need for multiple approvals. Where Part 3A applies to a project, the Minister for Planning is the consent authority. Applications for approval under Part 3A are lodged with the Department of Planning and must be supported by an Environmental Assessment Report. It is possible to apply for concept or project approval. Concept approval allows the development to be assessed at a strategic level to enable resolution of key environmental issues. This could be relevant to a

programme such as a mix of substation and distribution line upgrades and additions.

Part 3A also avoids the need for other approvals that may be required where a Part 4 development would otherwise be integrated development (e.g. Heritage permits) and/or would require approval under the Native Vegetation Act.

As Country Energy is approaching this project as a Part 3A application, the following has been prepared having regard to that decision.

State Environmental Planning Policies

State Environmental Planning Policy 71 – Coastal Protection

The aims of SEPP 71 relate to the protection and enhancement of the coastal environment to ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding environment.

Implications for the project:

As much of the study area is located within the coastal zone the provisions of SEPP 71 apply. *Clause 8* of SEPP 71 contains various matters to be taken into consideration by the consent authority which have been considered during the line route selection.

State Environmental Planning Policy 44 – Koala Habitat Protection

SEPP 44 encourages the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

Implications for the project:

If the preferred option for the network upgrade involves the removal of vegetation from land that has an area of more than 1 hectare (in a single location) and that section of the proposed line route is subject to a development application (under Part 4 of the EP&A Act), then an assessment under SEPP 44 for core Koala habitat will be necessary. If the area is found to be core Koala habitat, a Koala Plan of Management will be required in accordance with SEPP 44.

If land is Koala habitat then clearing may have significant impacts that would need to be assessed in the EAR.

State Environmental Planning Policy 14 – Coastal Wetlands

Within SEPP 14 wetlands development is declared to be designated development where it involves clearing, filling, construction of a levy or draining the land. Clearing includes tree removal, lopping and lower storey native vegetation removal (i.e. under scrubbing).

Implications for the Project

A preliminary assessment of the study area indicates that there are SEPP 14 Wetlands present. Therefore, the proposed network upgrade works could trigger the application of SEPP 14 to the project.

B.2.4 North Coast Regional Environmental Plan 1988

The study area is located within an area to which the *North Coast Regional Environmental Plan 1988* (NCREP) applies. The NCREP contains objectives that relate to development on the North Coast. Relevant sections of the NCREP that may be applicable to the route selection include agricultural resources, catchment management, the natural environment, coastal development, utility services and heritage.

Implications for the project:

Relevant sections of the NCREP should be considered in the assessment of any application resulting from the route selection process; however no specific approvals are required.

B.2.5 Local Environmental Plans

The proposed network upgrade is to be undertaken in the Lismore, Ballina and Byron Local Government Areas (LGA's) and as a result three local environmental plans are relevant to the project:

- *Lismore Local Environmental Plan 2000;*
- *Ballina Local Environmental Plan 1987; and*
- *Byron Local Environmental Plan 1988.*

The line routes are permissible in all zones that apply to the route options considered.

B.2.6 Other Legislation

Integrated Development

According to *Clause 91* of the EP&A Act development is integrated development if, as well as Council approval, it requires certain approvals under one or more of the following Acts:

- *Fisheries Management Act 1994;*
- *Heritage Act 1977;*
- *Mine Subsidence Compensation Act 1961;*
- *National Parks and Wildlife Act 1974;*
- *Protection of the Environment Operations Act 1997;*
- *Roads Act 1993;*
- *Rural Fires Act 1997; and*
- *Water Management Act 2000.*

The proposed network upgrade may potentially require approval under the *Fisheries Management Act 1994*, *National Parks and Wildlife Act 1974* and *Heritage Act 1977*. These would not apply to an application assessed under Part 3A.

Threatened Species Conservation Act 1995

Developments and activities requiring approval from a statutory authority of the NSW State Government are required to be assessed in accordance with the EP&A Act, as amended by the *Threatened Species Conservation Act 1995* (TSC Act).

Section 111(4) of the EP&A Act requires a determining authority to consider the effects of an activity on the following:

'(a) critical habitat, and

(b) in the case of threatened species, populations and ecological communities, and their habitats, whether there is likely to be a significant effect on those species, populations or ecological communities, or those habitats, and

(c) any other protected fauna or protected native plants within the meaning of the National Parks and Wildlife Act 1974.'

Implications for the project:

Clause 5A of the EP&A Act outlines several points which must be considered to determine the significance of the impact of the development on the habitat of threatened species, populations and ecological communities known or considered likely to occur in the study area and environs. A detailed Ecological Assessment, including an Assessment of Significance, would be required to determine the impacts once the preferred line routes have been selected.

Rivers and Foreshores Improvement Act 1948

Section 22B of the NSW Rivers and Foreshores Improvement Act 1948 requires a person to obtain a permit (known as a Part 3A permit) from the Department of Natural Resources prior to undertaking an excavation on protected land.

Section 22A defines protected land to include:

(a) land that is the bank, shore or bed of protected waters; or

(b) land that is not more than 40 metres from the top of the bank or shore of protected waters (measured horizontally from the top of the bank or shore); or

(c) material at any time deposited, naturally or otherwise and whether or not in layers, on or under land referred to in paragraph (a) or (b).

Protected waters means a river, lake into or from which a river flows, coastal lake or lagoon (including any permanent or temporary channel between a coastal lake or lagoon and the sea).

However, Clause 22H States:

(1) Except as provided by this section, this Part does not apply to or in respect of the exercise of any rights lawfully exercisable:

(a) under any lease, licence, permit or other right in force under any Act relating to mining or under the Crown Lands Act 1989 or Crown Lands (Continued Tenures) Act 1989, or

(b) by any public or local authority.

Implications for the Project:

Although under *Clause 22H* of the *Rivers and Foreshores Improvement Act 1948* Country Energy is exempted from requiring a permit to carry out any excavation work within 40 metres of a watercourse, it is accepted practice to consult with DNR prior to undertaking such work.

B.2.7 Summary and Conclusions

Part 3A presents an opportunity for a project to be considered as one application by one authority. Given the potential environmental impacts it is considered that Part 3A is the appropriate approvals path and community concerns and to address community concerns and potential impacts on endangered ecological communities.

B.3 ECOLOGY

B.3.1 Introduction

The study area consists of a largely cleared landscape dominated by cropping and grazing lands. 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 study area that are protected under the State Environmental Planning Policies (SEPPs) No. 14, 44 and 71 respectively.

Conservation areas occurring throughout the study area include:

- the Goonengary and Arakwal National Parks;
- the Tyagarah, Cumbebin Swamp, Broken Head, Hayter's Hill, Ballina, Uralba, and Wilson Nature Reserves; and
- the Cape Byron State Recreation Area.

Potential Impacts to the Ecology of the Study Area include:

- disturbance and/or removal of native vegetation (including SEPPP 14 wetland vegetation) for the upgrade and/or construction of transmission lines and their associated infrastructure. This activity may result in the disturbance or loss of habitat of threatened flora and fauna species, populations or ecological communities (short- and long-term impacts);
- disturbance and/or removal of soils (including stream-side soils) for the upgrade of poles. This activity may cause erosion or sedimentation impacts to waterways (e.g. the upgrade of the existing Ewingsdale transmission line option) (short- and long-term impacts);
- disturbance and/or degradation of habitat quality through on-going maintenance of transmission lines. This activity may cause the operation of legislated Key Threatening Processes, such as the invasion and establishment of various exotic weed species and predation by various exotic fauna species (short- and long-term impacts).

B.3.2 Ecological Resources in the Study Area

Threatened Species, Communities and Populations

The ecological attributes of the study area provide an array of potential habitats for 91 threatened flora and 100 threatened fauna species, two endangered populations and 14 endangered ecological communities listed under the NSW Threatened Species Conservation Act 1995.

Matters of National Environmental Significance protected under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 potentially occurring within the study area include 43 threatened flora species, 25 threatened fauna species, 20 protected migratory species and five endangered ecological communities. Threatened and migratory species, threatened populations and ecological communities identified as potentially occurring in the study area are listed in *Annex C*.

Key Habitats and Regional Corridors

Mapping provided by NSW National Parks and Wildlife Service (2003) indicates the study area supports 3 regional and 4 subregional fauna movement corridors. None of these corridors are expected to be significantly affected by the proposal such that their corridor function would be compromised.

Coastal Wetlands and Littoral Rainforests

Coastal Wetlands and Littoral Rainforests protected by State Environmental Planning Policies (SEPPs) No. 14 and No. 26 respectively. There are no littoral rainforests located along the proposed line routes; however there are SEPP 14 Wetland areas in the vicinity of the proposed network corridor options.

B.3.3 Results of Brief Field Investigations

A brief field investigation was conducted by an ERM ecologist between January 30 to February 1 2007. Based on observations of the availability of suitable habitat within the study area, the likelihood of occurrence of threatened species, populations, and ecological communities has been assessed within *Annex B*. This assessment also indicates areas identified in the study area as having the highest ecological value and the greatest abundance of previously recorded threatened species (i.e. 'ecological hot spots'). Ecological hot spots should be subject to further ecological field investigations to confirm the occurrence of the threatened species, populations or ecological communities and assess the potential impacts they may experience as a result of the proposal.

Ecological hot spots include the Skinner's Shoot to Broken Head and pockets of remnant vegetation along other sections of the overall route. Several other areas will require further brief ecological investigations for matters relating to threatened species/population/ecological community habitats and potential SEPP 14, 44, and 71 areas.

B.3.4 Conclusion

All of the proposed network upgrade activities pose potential impacts to ecological resources, including threatened species, populations, ecological communities and their habitats and further ecological assessments are required to be undertaken in identified ecological hot spots.

Ecological hot spots that require further assessments to identify and assess the significance of potential impacts to threatened and migratory species, threatened populations, ecological communities and their habitats include:

- Mullumbimby to Ewingsdale: Koala habitat (as defined under SEPP 44) may occur around the Dingo Lane and Tyagarah Creek areas. Where any vegetation removal is necessary in these areas, targeted searches and assessment for Koala habitat will be required. Previous records of two threatened species occurring within the study area will need to be confirmed;

- Ewingsdale to Suffolk Park (including the alternate line route option): the alternate line route option is considered to pose minimal impacts to the ecology of this area. Where the existing line is to be upgraded a targeted search for the threatened plant Arrow-head Vine will be required. Upgrading of transmission line poles will require assessment of the potential impacts of erosion and sedimentation to Simpson Creek. A flora and fauna habitat assessment (including the assessment of the SEPP 14 Ewingsdale wetland south-western fringes and SEPP 44 Koala habitat) may be required between Skinners Shoot and Lennox Head;

- Suffolk Park to Lennox Head: The environs of Suffolk Park and Broken Head are contiguous with those of the Skinners Shoot area and should be included in the flora and fauna habitat assessment. Dense native vegetation surrounding the 'Yarralee' property, if proposed to be cleared, should be subject to a flora and fauna habitat assessment;

- Lennox Head to Cumbalum: Riparian vegetation should be subject to flora assessment to confirm the presence of and assess potential impacts to Swamp Forest endangered ecological communities;

- Cumbalum to Alstonville via Tevan: A flora and fauna habitat assessment should be conducted in this area to confirm the presence of threatened species and their habitats which have been recorded as potentially occurring here. Areas of ecological significance between Cumbalum and

Alstonville route may potentially include threatened species, ecological communities, and their habitats;

- Alstonville to Lismore: A stand of native vegetation occurs along the existing alignment between the Alstonville Township and the existing Alstonville substation and should be subject to a flora and fauna habitat assessment. A flora and fauna habitat assessment should also be conducted in the areas surrounding the Wilson Nature Reserve and should include a SEPP 44 Koala assessment at Durheim Road. Any new line route options will likely require detailed ecological assessment as it is considered likely that vegetation would be impacted throughout the creation of new transmission corridors. Scattered woodland vegetation land on the south-eastern side of the existing Lismore substation will also require further ecological assessment; and

- Mitigation measures may be implemented within detailed transmission line upgrade designs and construction plans to mitigate some ecological impacts, such as avoiding sensitive areas where possible and spacing poles to either span wetlands and/or vegetation or to reduce potential easement widths in some areas.

B.3.5 Limitations

This assessment was undertaken with only limited verification of ecological communities, habitats or species in the field. The use of the NSW DEC Wildlife Atlas Database and the Commonwealth Environmental Reporting Tool with regard to threatened species occurrence is limited by spatial accuracy as many of the records have an approximate locality rather than a point specific accuracy. Further to this, errors have been known to occur during data entry of field survey information when the original records were made and then subsequently entered into the database. Therefore, these records are typically treated as indicative recordings. Further analysis of potential distribution must be made when site specific field survey is undertaken.

B.4 HERITAGE

B.4.1 Introduction

This investigation is a desktop study aimed at identifying the existing and potential cultural heritage constraints located along the proposed line route options. Cultural heritage refers to both Aboriginal heritage and historical heritage.

B.4.2 Aboriginal Heritage Study Methodology

The assessment involved:

- searching the Department of Environment and Conservations (DEC) Aboriginal Heritage Management Information System (AHIMS) database for information on Aboriginal sites in the local area and previous investigations undertaken in the region; and
- reviewing information relevant for understanding the local environment and history of land use.

B.4.3 Aboriginal Cultural Heritage

The proposed study area crosses landforms that may contain evidence of Aboriginal occupation. The study area can be divided into two 'zones' being the coastal and riverine areas near Ballina and Byron Bay and the hinterland areas near Lismore and Mullumbimby. Each of these areas may have been characterised by similar patterns of Aboriginal occupation.

B.4.4 Environmental Context

The study area is located within relatively low lying country with gently undulating terrain and some low lying flood plain with some higher points between Alstonville and Lismore.

The study area is situated in an environment that has a mixture of environmentally significant native vegetation, cleared farming land and urban areas. The native woodland would have provided a range of animal and plant species suitable for consumption and use by Aboriginal people including possums, macropods, birds, reptiles, and wood and bark for the production of weapons, shields, carrying implements, shelters and other items. The study area is also situated within close proximity to resource rich environments including: the rivers, creeks, wetlands and the coastal zone. These environments, sustain ecological communities that would have been (and continue to be) of great value to Aboriginal people. They are inhabited

by a diversity of bird, fish, shellfish, mammal and plant species that would have been important resources to Aboriginal people in the past.

B.4.5 Archaeological Context

AHIMS Database Results

A search of the Department of Conservation's Aboriginal Heritage Management System (AHIMS) database was undertaken. This search identified 171 Aboriginal objects and Aboriginal places are located within 5 kilometres of the proposed line route options. A number of these Aboriginal objects and places are located within very close proximity to the proposed line route options as depicted on *Figures (1 to 6)E* in *Annex A*.

Aboriginal (Social) Value

The significance of Aboriginal heritage is assessed by both archaeologists and Aboriginal people and the assessment provided by the community may include Aboriginal places and sites that contain no archaeological evidence. All sites are regarded by Aboriginal people to be culturally significant. This general statement may relate to the artefacts themselves (including shell and other faunal material), the location at which artefacts or sites occur and also the natural environment associated with sites. No Aboriginal consultation was undertaken for this study.

B.4.6 Historical Context

Heritage Databases, Registers and Inventories

In order to ascertain if heritage items are located within the study area, databases, registers and inventories have been searched. These include:

- Australian Heritage Database;
- State Heritage Register and Inventory (NSW Heritage Office);
- North Coast Regional Environmental Plan;
- Lismore Local Environmental Plan 2000;
- Ballina Local Environmental Plan 1987; and
- Byron Local Environmental Plan 1988.

There are numerous historical heritage sites located within the study area. As the proposed line route will not impact on any buildings or areas of significant vegetation it is not likely that any items or sites will be affected. A detailed

heritage assessment would be required as part of the Environmental Impact Assessment. It is noted that the heritage listed Mullumbimby and Lismore South Power Station building are currently subject to heritage assessments as part of the overall proposed network upgrade.

B.4.7 Cultural Heritage Constraints

Known Constraints

A number of recorded Aboriginal sites are located within 500 metres of the proposed line route options. These sites are unlikely to be a major constraint on the upgrade or construction of new transmission line. Once identified, the proposed location of poles may be moved to avoid impacting these sites.

Potential Constraints

The proposed network upgrade options may impact on Aboriginal cultural heritage with an increasing likelihood of impact in areas where the corridor crosses or is close to watercourses, ridges or resource rich environments including floodplains and wetlands.

There is limited potential for unrecorded historical heritage items to be directly impacted during activities associated with the proposed augmentation. Larger heritage items, including buildings and farm machinery should be avoided (if any).

B.4.8 Conclusions and Recommendations

No major known constraints were identified within the proposed line route corridor options. Further archaeological investigation would be required prior the construction of transmission lines in sensitive areas (i.e. wetlands). Such investigation will require a field survey to accurately identify known archaeological sites and to identify unrecorded archaeological sites within the proposed expanded corridor. Consultation with Aboriginal communities and historical society's will also need to be undertaken during the assessment and approvals process.

B.5 ACID SULFATE SOILS

Acid sulfate soils are soils (or sediments) that contain pyrite (iron sulfide). The exposure of pyrite to oxygen and water leads to the generation of sulfuric acid. Such acidic leachate has the ability to dissolve heavy metals in clay and doing so, release toxic concentrations of other heavy metals into water bodies. Such concentrations may prove detrimental to water quality and may lead to the death or disease of aquatic organisms. Acid sulfate contamination has been known to arise in areas where excavation or disturbance of acid sulfate soil has taken place.

Reference to the Department of Natural Resources 1:25,000 acid sulfate soil risk maps indicates that Medium to High Probability acid sulfate soils occur extensively across the low lying parts of the study area as shown in *Figures (1 to 6)C* in *Annex A*.

B.5.1 Conclusion

According to the maps, Medium to High Probability acid sulphate soils occur beneath large sections of the existing 66kV Lismore Ring alignment, particularly between Ewingsdale and Ballina. The proposed new 132kV line route options for Brunswick Heads also encounter Medium to High Probability acid sulphate soils along large section of the proposed line route options.

B.6 HYDROLOGY AND FLOODING

The study area is located across 3 major catchments areas and one minor catchment area. The Wilson River is located to the southwest of the study area and flows north to south through Lismore. The southeast of the study generally drains to the Richmond River via North Creek and Emigrant Creek which flows towards Ballina. The northern portion of the study area generally drains the Brunswick River flowing west to east, whilst a smaller catchment in the Byron Bay/Suffolk Park area drain to Belongil Creek.

Ballina Council provided flood mapping for *Section 4* of the study area. The mapping provided indicates that the majority of the low lying portion of this section of the study area is potentially subject to flood inundation from a 1 in 100 year average recurrence interval (ARI) flood event. The extent 1 in 100 year ARI flood and impact on the proposed line route options is provided on *Figures (1 to 6)A* of *Annex A*.

Faster flowing flood waters are expected to occur along the main drainage channels. The extent 1 in 100 year ARI flood and impact on the proposed line route options is provided on *Figure 6* of *Annex A*.

Flood mapping was not available for the Lismore local government area.

B.6.1 Conclusion

All of the line route options in and around Ballina are significantly impacted by the 1 in 100 year ARI zones.

B.7 VISUAL AMENITY

The proposed transmission line upgrade will start from the Mullumbimby substation just to the west of the township of Mullumbimby. From here the line runs in a south easterly direction through undulating land, then east to Ewingsdale which is west of the town ship of Byron Bay. The existing route runs for the most part over cleared farmland. Refer Figure 1.

To the east of Ewingsdale the transmission line runs in close proximity to SEPP 14 Wetlands. At this point the route turns in a generally south east direction towards Skinners Shoot through hilly country before turning south and heading towards Suffolk Park, Broken Head, Lennox Head, Tintenbar and then Ballina generally through coastal lowlands and floodplains. From Ballina the route returns north, then west via Tevan over higher terrain and in close proximity to residences near Tevan and in Alstonville. As it heads towards Alstonville the route traverses more undulating terrain.

Around Alstonville the countryside is predominantly undulating with macadamia farming becoming the predominant land use as well as grazing. The landscape between Alstonville and Lismore consists of a number of drainage systems trending north south with some steep ridge lines encountered as the line heads westward. South of Lismore the route is across generally flatter land to the south of residential areas. A steep ridge is crossed before the route reaches the Lismore South Zone Substation and finally the Lismore South Zone Substation.

Of the specific upgrades proposed only a certain number are expected to have any visual impacts due to the nature of the construction involved in the upgrades. The upgrade construction types can be described as follows:

- Replacement of existing 66kV transmission infrastructure with 132kV transmission infrastructure has the potential to create visual impacts due the length of line being upgraded and the number of potential receptors;
- Construction of new 132kV transmission lines has the potential to create visual impacts due the length of line being upgraded and the number of potential receptors;
- Construction of new 66kV transmission lines has the potential to create visual impacts due to the insertion of new infrastructure into the landscape; and
- Construction of new 66kV underground transmission lines. This type of construction could be expected to have localised visual impacts. The location where the transmission line goes underground requires a heavier and more visually obtrusive structure which may increase visual impact at these points.

B.7.1 Preliminary Corridor Constraints and Visual Issues

A preliminary assessment of the proposed line routes was carried out by ERM which identified a number of key environmental issues for the specific upgrades above. These issues included proximity to State significant wetlands and water crossings, potential vegetation and habitat impacts, flooding, acid sulphate soils, proximity to residential areas and visual amenity. The key *visual issues* are summarised in the following sections below and are based by observations carried out during visual assessment inspections on the 1st of February 2007.

Mullumbimby to Ewingsdale

The existing 66kV corridor between Mullumbimby (*Point A* on *Figure 1*) and Ewingsdale (*Point C* on *Figure 1*) passes through extensive areas of cleared rural land. However, it is important to recognize that the transmission line is generally located on the valley floors in fields which are broken up by the canopies of retained shade trees and the pattern of trees retained on hill slopes.

Plate B1 – View north toward Mullumbimby

In many instances the visual impact of the transmission is already low with the greatest impact created when viewing the existing poles in silhouette. The existing line passes in close proximity to several rural residences which will need to be considered for future line route selection.

Plate B2 – Views south toward Ewingsdale

Ewingsdale to Suffolk Park

The existing 66kV sub-transmission line out of Ewingsdale Substation to the south passes in close proximity to residences in Ewingsdale. It is considered likely that the upgrade will generate community concerns.

Plate B3 – Residential street in Ewingsdale

Further southeast and to the south west of Byron Bay, the existing 66kV winds through a residential area known as Skinners Shoot. The existing 66kV easement follows road reserves in this area and the line passes in close proximity to residences. The area of Skinners Shoot is densely vegetated and

provides sufficient screening from the majority of residences which tend to be located back from the road. If clearing is required for within the existing or a for the proposed transmission line this would likely significantly impact the visual impacts in the Skinners Shoot area.

Plate B4 – Dense vegetation in Skinner Shoot area

Suffolk Park to Lennox Head

The existing 66kV sub-transmission line passing the proposed Suffolk Park substation and the Lennox Head zone substation generally traverses cleared rural land and/or is within a road reserve.

In this location the line is seen by the majority of receptors against a backdrop of retained lowland vegetation and the visual impacts will only be related to the replacement of old infrastructure with new.

Plate B5 – View south towards Lennox Head

Lennox Head to Ballina

The existing 66kV sub-transmission line passes in close proximity to residences and through a remnant stand of vegetation in a steep section to the south of Lennox Head zone substation near Tintenbar.

Plate B6 – Steep vegetated residential area at Tintenbar

Any clearing of vegetation for the proposed transmission would likely impact such vegetation with consequent visual impacts, and is considered likely to

generate community concerns. From this point onwards south to Ballina zone substation the existing line passes through extensive areas of cleared rural land and/or is located within a road reserve. The visual impacts will be related to the replacement of old infrastructure with new.

Plate B7 – Low lying cleared river flats entering Ballina

Ballina to near Alstonville

The existing 66kV line (**feeder 8503**) via Tevan passes in close proximity to residences near Tevan and in Alstonville which will need to be considered for future line route selection. The majority of the line between these location traverses undulating land with extensive areas of cleared rural land, orchards and/or is located within a road reserve. The visual impacts here will be related to the replacement of old infrastructure with new and/or new infrastructure within new corridors.

The existing 66kV line (**feeder 8507**) via the Pacific and Bruxner Highways generally traverses undulating land with extensive areas of cleared rural land, and generally adjoins or is within the highway road reserves. The visual impacts here will be related to the replacement of old infrastructure with new and/or new.

Plate B7 – Existing line close to residences near Tevan

Near Alstonville to Lismore 132/66kV Substation

The existing 66kV sub-transmission line passes through extensive areas of cleared rural land, orchards and road reserve. Upgrading the line to dual circuit 66kV/132kV would increase the visual impact, but would not likely have significant impacts to native vegetation. A new line route would result in significant visual impact including the likely need to clear vegetation for the new corridor.

Plate B8 – View west toward Lismore, close to residence

Plate B9 – View west toward Lismore – cleared rural land and orchards

Lismore University Substation to Switching Station

The proposed new underground infrastructure is not expected to have significant impact on the visual natural environment.

Lismore University to Lismore South

It is likely that the proposed new separate 66kV lines route can be constructed in largely cleared rural lands and road reserves. Line route options to the north of the existing 66kV Lismore to near Alstonville line will need to consider the small National Park (Wilson Park) located to the south of Lismore. Constructing multiple lines with existing corridor will however increase the visual impact in such sections.

Lismore to Lismore South

The proposed underground 66kV line is not considered likely to encounter significant visual issues.

Annex C

List of Threatened Species

Threatened Species, Populations and Ecological Communities Previously Recorded or Potentially Occurring Within the Study Area

Scientific Name	Common Name	Conservation Status	
		EPBC	TSC
Threatened Ecological Communities			
Bryon Bay Swarf Graminoid Clay Heath Community		-	E
Coastal Saltmarch in the NSW North Coast, Sydney Basin and South East Corner Bioregions		-	E
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions		-	E
Hunter Lowland Red Gum Forest in the Sydney Basin and NSW North Coast Bioregions		-	E
Littoral Rainforest in the NSW North Coast, Sydney basin and South East Corner Bioregions		-	E
Lowland Rainforest on Floodplain in the NSW North Coast Bioregions		-	E
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney basin, South East Corner, South Eastern Highlands and Australian Alps		-	E
River-flat Eucalypt Forest on Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		-	E
Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion		-	E
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions		-	E
Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions		-	E
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		-	E
White Box Yellow Box Blakely's Red Gum Grassy Woodland		CE	E
Threatened Populations			

Emu, *Dromaius novaehollandiae*, population in NSW North Coast Bioregion and Port Stephens LGA		-	E
Cobaki Lakes and Tweed Heads West population of the Long-nosed Potoroo *Potorus tridactlyus*		-	E
Plants			
Acacia bakeri	Marblewood	-	V
Acalypha eremorum	Acalypha	-	E
Acronychia littoralis	Scented Acronychia	E	E
Allocasuarina defungens	Dwarf Heath Casuarina	-	E
Amorphospermum whitei	Rusty Plum	-	V
Archidendron hendersonii	White Lace Flower	-	V
Arthraxon hispidus	Hairy Jointgrass	V	V
Baloghia marmorata	Jointed Baloghia	V	V
Bosistoa transversa	Heart-leaved Bosistoa	V	V
Bulbophyllum globuliforme	Hoop Pine Orchid	V	V
Calophanoides hygrophiloides	Native Justicia	-	E
Chamaesyce psammogeton	Sand Spurge	-	E
Choricarpia subargentea	Giant Ironwood	-	E
Clematis fawcettii	Stream Clematis	V	V
Corchorus cunninghamii	Native Jute	E	E
Corokia whiteana	Corokia	V	V
Crypotstylis hunteriana	Leafless Tongue-orchid	V	-
Cryptocarya foetida	Stinking Cryptocarya	V	V
Cyperus rupicola	Cliff Sedge	-	V
Davidsonia jerseyana	Davidson's Plum	E	E
Davidsonia johnsonii	Smooth Davidson's Plum	-	E
Davidsonia pruriens var. jerseyana*	Davidson's Plum, Ooray	E	-
Davidsonia sp. Mullumbimby-Currumbin Ck (A.G.Floyd 1595) *	-	E	-
Desmodium acanthocladum	Thorny Pea	V	V
Diospyros mabacea	Red-fruited Ebony	E	E
Diploglottis campbellii	Small-leaved Tamarind	E	E
Diuris sp. aff. chrysantha	Byron Bay Diuris	-	E
Doryanthes palmeri	Giant Spear Lily	-	V
Drynaria rigidula	Basket Fern	-	E

Eidothea hardeniana	Nightcap Oak	-	E
Elaeocarpus sp. Rocky Creek	Minyon Quandong	E	E
Elaeocarpus williamsianus	Hairy Quandong	E	E
Endiandra floydii	Crystal Creek Walnut	V	E
Endiandra hayesii	Rusty Rose Walnut	V	V
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	-	E
Floydia praealta	Ball Nut	V	V
Fontainea australis	Southern Fontainea	V	V
Fontainea oraria	Coastal Fontainea	E	E
Geijera paniculata	Axe-Breaker	-	E
Geodorum densiflorum	Pink Nodding Orchid	-	E
Gossia fragrantissima	Sweet Myrtle	-	E
Gossia fragrantissima (formerly Austromyrtus fragrantissima)	Scale Myrtle, Sweet Myrtle	E	E
Grammitis stenophylla	Narrow-leaf Finger Fern	-	E
Grevillea hilliana	White Silky Oak/Yiel Yiel	-	E
Hibbertia hexandra	Tree Guinea Flower	-	E
Hicksbeachia pinnatifolia	Red Boppel Nut	V	V
Isoglossa eranthemoides	Isoglossa	E	E
Macadamia tetraphylla	Rough-shelled Bush Nut	V	V
Marsdenia longiloba	Slender Marsdenia	V	E
Melicope vitiflora	Coast Euodia	-	E
Ochrosia moorei	Southern Ochrosia	E	E
Owenia cepiodora	Onion Cedar	V	V
Ozothamnus vagans	-	V	
Peristeranthus hillii	Brown Fairy-chain Orchid	-	V
Phaius australis	Southern Swamp Orchid	E	E
Phaius tankarvilleae	Lady Tankarville's Swamp Orchid	-	E
Phyllanthus microcladus	Brush Sauropus	-	E
Plectranthus nitidus	Nightcap Plectranthus	-	E
Pterostylis nigricans	Dark Greenhood	-	V
Randia moorei	Spiny Gardenia	E	E
Rapanea sp. A Richmond River	Ripple-leaf Muttonwood	E	E

Sarcochilus dilatatus	Brown Butterfly Orchid	-	E
Sarcochilus fitzgeraldii	*Ravine Orchid*	V	
Sarcochilus hartmannii	Hartman's Sarcochilus	V	V
Senna acclinis	Rainforest Cassia	-	E
Sophora fraseri	Brush Sophora	V	V
Symplocos baeuerlenii	Small-leaved Hazelwood	V	V
Syzygium hodgkinsoniae	Red Lilly Pilly	V	V
Syzygium moorei	Durobby	V	V
Syzygium paniculatum	Magenta Lilly Pilly	-	V
Tarenna cameronii	Cameron's Tarenna	-	E
Thesium australe	Austral Toadflax	V	V
Tinospora smilacina	Tinospora Vine	-	E
Tinospora tinosporoides	Arrow-head Vine	V	V
Uromyrtus australis	Peach Myrtle	E	E
Xylosma terrae-reginae	Queensland Xylosma	-	E
Birds			
Amaurornis olivaceus	Bush-hen	-	V
Anseranas semipalmata	Magpie Goose	-	V
Atrichornis rufescens	Rufous Scrub-bird	-	V
Botaurus poiciloptilus	Australasian Bittern	-	V
Burhinus grallarius	Bush Stone-curlew	-	E
Calidris alba	Sanderling	-	V
Calidris tenuirostris	Great Knot	-	V
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	-	V
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	V
Charadrius leschenaultii	Greater Sand-plover	-	V
Charadrius mongolus	Lesser Sand-plover	M	V
Climacteris picumnus	Brown Treecreeper	-	V
Coracina lineata	Barred Cuckoo-shrike	-	V
Cyclopsitta diophthalma coxeni	Coxen's Fig-parrot	E, M	E
Diomedea dabbenena	Tristan Albatross	M	-
Diomedea dabbenena *	Tristan Albatross	E	-
Diomedea exulans	Wandering Albatross	-	E
Ephippiorhynchus asiaticus	Black-necked Stork	-	E
Erythrotriorchis radiatus	Red Goshawk	-	E
Esacus neglectus	Beach Stone-curlew	-	E
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	M	-

Grus rubicunda	Brolga	-	V
Gygis alba	White Tern	-	V
Haematopus fuliginosus	Sooty Oystercatcher	-	V
Haematopus longirostris	Pied Oystercatcher	-	V
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	-
Hirundapus caudacutus	White-throated Needletail	M	-
Irediparra gallinacea	Comb-crested Jacana	-	V
Ixobrychus flavicollis	Black Bittern	-	V
Lathamus discolor	Swift Parrot	E	E
Lichenostomus fasciogularis	Mangrove Honeyeater	-	V
Limicola falcinellus	Broad-billed Sandpiper	-	V
Limosa limosa	Black-tailed Godwit	-	V
Lophoictinia isura	Square-tailed Kite	-	V
Macronectes giganteus	Southern Giant-Petrel	M	-
Macronectes giganteus *	Southern Giant-Petrel	E	-
Macronectes halli	Northern Giant-Petrel	M	-
Macronectes halli *	Northern Giant-Petrel	V	-
Menura alberti	Albert's Lyrebird	-	V
Merops ornatus	Rainbow Bee-eater	M	-
Monarcha leucotis	White-eared Monarch	-	V
Monarcha melanopsis	Black-faced Monarch	M	-
Monarcha trivirgatus	Spectacled Monarch	M	-
Myiagra cyanoleuca	Satin Flycatcher	M	-
Ninox strenua	Powerful Owl	-	V
Pachycephala olivacea	Olive Whistler	-	V
Pandion haliaetus	Osprey	-	V
Pezoporus wallicus wallicus	Eastern Ground Parrot	-	V
Phaethon rubricauda	Red-tailed Tropicbird	-	V
Phoebetria fusca	Sooty Albatross	-	V
Pluvialis fulva	Pacific Golden Plover	M	-
Podargus ocellatus	Marbled Frogmouth	-	V
*Poephila cincta cincta**	Black-throated Finch (southern)	E	-

Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	-	V
Procelsterna cerulea	Grey Ternlet	-	V
Pterodroma leucoptera leucoptera	Gould's Petrel	-	E
*Pterodroma neglecta neglecta**	Kermadec Petrel (western)	V	-
Pterodroma nigripennis	Black-winged Petrel	-	V
Pterodroma solandri	Providence Petrel	-	V
Ptilinopus magnificus	Wompoo Fruit-Dove	-	V
Ptilinopus regina	Rose-crowned Fruit-Dove	-	V
Ptilinopus superbus	Superb Fruit-Dove	-	V
Puffinus assimilis	Little Shearwater	-	V
Puffinus carneipes	Flesh-footed Shearwater	-	V
Puffinus leucomelas	Streaked Shearwater	M	-
Puffinus pacificus	Wedge-tailed Shearwater	M	-
Rhipidura rufifrons	Rufous Fantail	M	-
Rostratula australis *	Australian Painted Snipe	V	-
Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	M	E
Sterna albifrons	Little Tern	-	E
Sterna fuscata	Sooty Tern	-	V
Stictonetta naevosa	Freckled Duck	-	V
Sula dactylatra	Masked Booby	-	V
Sula dactylatra	Masked Booby	-	V
Thalassarche impavida	Campbell Albatross	V, M	-
Todiramphus chloris	Collared Kingfisher	-	V
Turnix maculosa	Red-backed Button-quail	-	V
Turnix melanogaster	Black-breasted Button-quail	V	E
Tyto capensis	Grass Owl	-	V
Tyto novaehollandiae	Masked Owl	-	V
Tyto tenebricosa	Sooty Owl	-	V
Xanthomyza phrygia	Regent Honeyeater	E, M	E
Xenus cinereus	Terek Sandpiper	-	V
Amphibians		-	-
Assa darlingtoni	Pouched Frog	-	V
Crinia tinnula	Wallum Froglet	-	V

Litoria aurea	Green and Golden Bell Frog	V	E
Litoria olongburensis	Olongburra Frog	V	V
Mixophyes fleayi	Fleay's Frog	E	-
Mixophyes iteratus	Giant Barred Frog	E	E
Philoria loveridgei	Loveridge's Frog	-	E
Reptiles		-	-
Caretta caretta	Loggerhead Turtle	E	E
Chelonia mydas	Green Turtle	E	V
Dermochelys coriacea	Leathery Turtle	V	V
Cacophis harriettae	White-crowned Snake	-	V
Hoplocephalus stephensii	Stephens' Banded Snake	-	V
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V	V
Mammals			
Aepyprymnus rufescens	Rufous Bettong	-	V
Arctocephalus pusillus doriferus	Australian Fur-seal	-	V
Balaenoptera musculus *	Blue Whale	E	-
Cercartetus nanus	Eastern Pygmy-possum	-	V
Chalinolobus dwyeri *	Large-eared Pied Bat, Large Pied Bat	V	-
Dasyurus maculatus	Spotted-tailed Quoll	E	V
Dugong dugon	Dugong	-	E
Eubalaena australis *	Southern Right Whale	E	-
Kerivoula papuensis	Golden-tipped Bat	-	V
Megaptera novaeangliae	Humpback Whale	V	V
Miniopterus australis	Little Bentwing-bat	-	V
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	-	V
Myotis adversus	Large-footed Myotis	-	V
Nurus atlas	Atlas Rainforest Ground-beetle	-	E
Nurus brevis	Shorter Rainforest Ground-beetle	-	E
Nyctimene robinsoni	Eastern Tube-nosed Bat	-	V
Nyctimene robinsoni	Eastern Tube-nosed Bat	-	V
Nyctophilus bifax	Eastern Long-eared Bat	-	V
Petaurus australis	Yellow-bellied Glider	-	V
Petrogale penicillara	Brush-tailed Rock-wallaby	V	-

Phascolarctos cinereus	Koala	-	V
Physeter macrocephalus	Sperm Whale	-	V
Planigale maculata	Common Planigale	-	V
Potorous tridactylus	Long-nosed Potoroo	V	V
Pteropus alecto	Black Flying-fox	-	V
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	V
Scoteanax rueppellii	Greater Broad-nosed Bat	-	V
Syconycteris australis	Common Blossom-bat	-	V
Thylogale stigmatica	Red-legged Pademelon	-	V
Invertebrates			
Thersites mitchellae	Mitchell's Rainforest Snail	-	E