7 ABORIGINAL HERITAGE

7.1 INTRODUCTION

An Aboriginal heritage assessment was undertaken titled *Lismore to Mullumbimby Electricity Network Upgrade: Aboriginal Heritage Assessment* (ERM, 2008c) (hereafter referred to as 'the Aboriginal heritage assessment') for the proposed Lismore to Mullumbimby electricity network upgrade and is provided in *Annex I*. This chapter provides a summary of the key findings of the investigation.

7.1.1 Background

Background research indicated 171 Aboriginal archaeological sites previously recorded within a five kilometre (km) radius of the Project Area. Most of these sites were located along the coast and coastal lowlands near Byron Bay, Suffolk Park, Lennox Head, Skennars Head, Broken Head and Ballina. The most common site types identified were artifact scatters or isolated artifacts and middens. Other site types found included burials, ceremonial sites, dreaming sites, PADs, hearths, scarred trees and habitation sites. None of these sites occur directly within the Project Area. The lack of recorded Aboriginal archaeological sites within the Project Area is most likely attributed to land use activities including intense vegetation clearing, channeling of swamps and watercourses and the extensive use of the area by Europeans and their descendants since the early 1840s for pastoral and agricultural activities.

Native Title Land Claims

The Native Title claims that are active in the study area are listed in *Table 7.1*.

Table 7.1 Active Title Claims within the Study Area

Location of Claim	Active Native Title Claim
Byron Shire Council	*Bundjalung People #1*
	Widjabul Aboriginal People
	Bundjalung People #3
Ballina Shire Council	*Widjabul Aboriginal People*
	Bundjalung People #3
Lismore City Council	*Widjabul Aboriginal People*
	Bundjalung People #2

The search of all active Title Claims identified that no claims had been awarded in the study area. All the above claimants were consulted throughout the Aboriginal heritage assessment phase of the Project. A consultation log is provided in *Annex A* of *Annex I*.

7.1.2 Community Consultation

Consultation with the Ngulingah, Jali and Tweed Byron Local Aboriginal Land Councils (LALCs) and other interested parties was undertaken in accordance with the

DECC publication *"Interim Community Consultation Requirements for Applicants"* (2004).

Consultation involved three stages:

- Stage 1: Initial start-up meeting;
- Stage 2: Survey; and
- Stage 3: Post survey discussion meeting.

7.2 ARCHAEOLOGICAL SURVEYS

7.2.1 Methodology

Areas of Aboriginal archaeological sensitivity (i.e. areas with the potential for Aboriginal sites to be present) were determined by a site prediction model and from community consultation. Surveys focused on areas of Aboriginal archaeological sensitivity and areas where ground disturbance or earthworks are proposed as part of the Project.

Areas Surveyed for this Assessment

The following areas were identified for survey in this assessment:

- between Lismore South substation and Lismore BSP substation;
- between Lismore BSP substation and the existing power line (0897) that is located south of Lismore BSP substation;
- the Suffolk Park substation site;
- in Ewingsdale where underground cabling is proposed; and
- the proposed Brunswick Heads substation site.

Areas where new transmission lines are proposed or excavation will occur were traversed on foot to look for any unrecorded Aboriginal sites or land forms that may contain sub-surface archaeology (PADs). A hand held GPS was used to record the survey transects.

Additional Areas to be Surveyed if Ground Disturbance is Proposed

Other areas within the Project Area were also identified as being sensitive in terms of potential Aboriginal heritage items or places but were not surveyed as there is no ground surface disturbance proposed outside of existing corridors at this stage. If ground surface disturbance is proposed in the future surveys of these areas should be undertaken prior to any work commencing. These locations are:

- between Lismore South substation and Goonellabah;
- at Ballina between Teven Road and North Creek canal;
- at Cumbulam, Tintenbar and Newbury; and
- the area near the Suffolk Park Substation sites (outside the areas surveyed in this assessment).

Areas Requiring Survey When the Preferred Route Options are Known

The following areas were identified for survey and further community consultation once preferred route options are known by Country Energy:

- between Lismore South substation and Lismore switching station where proposed underground cabling is likely to be installed; and
- within the Brunswick Heads Feeder Loop corridor.

7.3 RESULTS

The Aboriginal Heritage Assessment undertaken for the Project resulted in the discovery of one new site (BH Grinding Site 1). The results of this assessment are discussed further in the following sections.

7.3.1 New Transmission Line Corridors

Lismore South Substation to Lismore BSP Substation and Lismore BSP Substation to the Existing Alstonville Power Line

There are no known heritage constraints in these corridors. However, given the relatively undisturbed nature of the ground surface and known Aboriginal Heritage sites in the vicinity any works that result in the disturbance of the ground surface (excluding disturbed areas within Three Chain Road reserve), such as excavation for new transmission line poles, removal of vegetation or trenching, should be monitored by LALC representatives and other interested parties.

Underground Transmission Lines linking Ewingsdale Substation

There are no known heritage constraints in this corridor. The field survey indicated that due to the disturbed nature of the site there is limited possibility of artefacts being discovered. As the proposed work involves ground disturbance (trenching) all construction personnel should be made aware of their responsibilities if any Aboriginal artefacts are uncovered through the recommended Cultural Heritage Induction.

7.3.2 New Substations

Suffolk Park Substation Locations

The proposed Suffolk Park substation location (Site 7) is potentially sensitive as burials may have occurred there due to the sandy deposits present. It was noted within the MWH report (refer *Annex Q*) that anecdotal evidence was provided that diseased pigs from the former piggery were buried in pits in the vicinity. Identification of any bones exposed will therefore require some level of assessment as to whether they are of human origin. A Burial Management Plan will be required prior to the commencement of works on site. The Burial Management Plan simply puts into place several protocols to be undertaken in the event of skeletal material being uncovered including:

- all works in the immediate vicinity of the burial should be halted;
- the police contacted;
- a Local Aboriginal Representative contacted if not already present on site;
- if required a suitably qualified archaeologist or physical anthropologist contacted; and
- once ascertained that the burial is in fact Aboriginal, the local Aboriginal community should be consulted on how best to proceed. The options available at this point are dependant on the development type. If it is possible, the burial should not be disturbed further, however if plans for the development do not allow for this, then often the remains can be reburied as closely as possible to there original location.

Brunswick Heads Substation Site

The site identified at Brunswick Heads for the substation holds significance both to the Aboriginal community and to the scientific community as grinding bowls and tools were identified at this site during the survey. *Figure 7.1* presents examples of the grinding bowls observed near the proposed substation site.

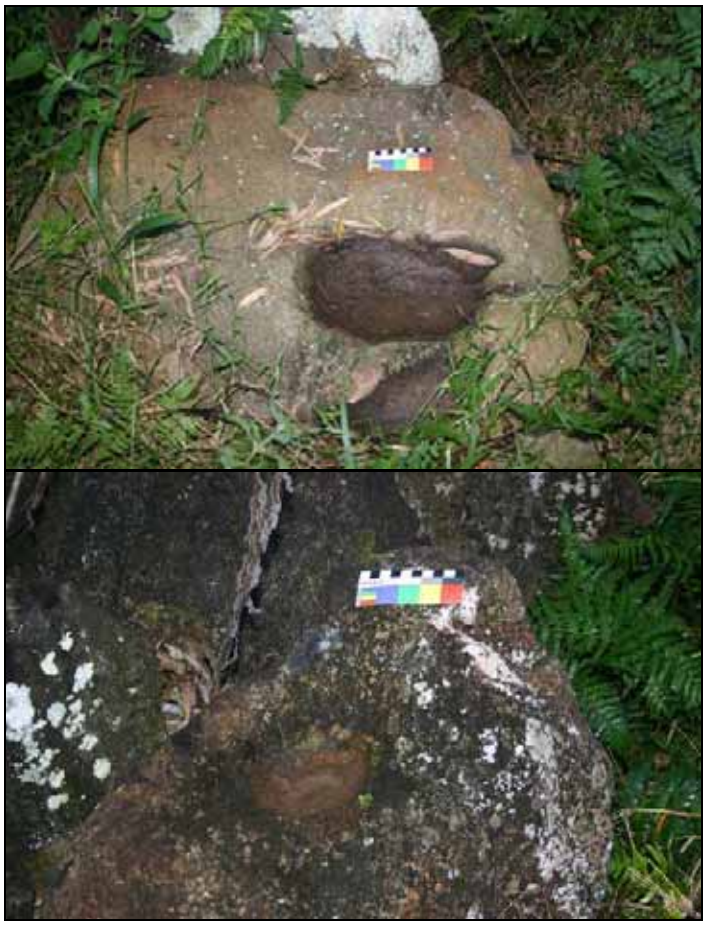


Figure 7.1 Examples of grinding bowls at Brunswick heads substation site

Food processing sites are rare within the local area and within the region, and therefore further archaeological investigation of this site is important to both the scientific and Aboriginal communities. This investigation should be undertaken in the following manner:

- the area to be impacted by the new substation construction and all associated excavation areas should be marked out by Country Energy as well as identifying where heavy machinery will be used;
- archaeologists and the LALC members should undertake any vegetation clearing to ensure that any features still in their original context are not further disturbed;
- a mixture of hand excavation and grader scrapers should be used to search for any signs of hearths or associated features relating to food or tool production, and potentially even evidence of built structures. This is likely to take at least one week, longer if a number of artefacts are found;
- any features found should be hand excavated and fully recorded;
- the standing features of the site (the grinding bowls and grinding grooves) should be fully recorded at this time;

- any material found during the excavation should be recorded and if more grinding bowls and grinding grooves are found these should be placed with the other translocated features under the stand of trees at the site. Any small finds, including lithics and shell, should be analysed by an archaeologist and then also returned to the site;

- once the site excavation is finished, the archaeologists are to indicate the areas where fences should be erected to ensure the grinding bowls and grooves (and any other items found) are protected during construction works; and

- a report should be completed for the works and interpretative signage should be created to indicate the Aboriginal site and any additional information the excavation revealed about the use of the site.

7.4 RECOMMENDATIONS AND MITIGATION MEASURES

The following recommendations are made in light of the findings of the surveys undertaken, the background research, the predictive modelling and relevant NSW legislation protecting historic and Aboriginal heritage.

Surveys should be undertaken and Aboriginal community consultation completed for the following areas once preferred line route options have been identified by Country Energy:

- between Lismore South Substation and Lismore switching station; and

- within the Brunswick Heads Feeder Loop corridor.

The following management and mitigation measures are recommended:

- A Cultural Heritage Induction of the construction crew supervisors should take place prior to construction. This is to explain the nature of the monitoring and the requirements for when an archaeologist is to be notified. Handouts showing Aboriginal sites will be circulated and the procedure to follow in the case of Aboriginal burials being uncovered explained. The induction can be carried out by an archaeologist. In addition, a Site Contractors Heritage Handbook can be provided if required. This summarises all the key heritage issues and recommendations, provides contact details of archaeologists and LALCs, provides maps indicating areas that require monitoring and has information sheets showing archaeological sites sand areas to be fenced off and avoided.

- If ground disturbance or vegetation removal is proposed outside existing power line corridors in any sensitive areas identified in *Section 6.1.2* and illustrated in on *Figures 6.1 to 6.3* of the Aboriginal Heritage Assessment (*Annex I*), archaeological surveys and further assessment should be completed.

- Any works that result in the disturbance of the ground surface, such as excavation for new transmission line poles, removal of vegetation or trenching, should be monitored by LALC representatives and other interested parties between the Lismore BSP substation south to the existing Alstonville power line.

- A Burial Management Plan and monitoring of all clearance and earth works is to occur at the proposed Suffolk Park substation site (Site 7) due to the sensitive nature of the area. Monitoring by LALC representatives and other interested parties should also be carried out when clearing or excavation works are being

undertaken for transmission line connection of the new substation to the existing network.

- Further archaeological investigation is recommended at the Brunswick Heads Substation site prior to the construction commencing. As this is a Part 3A Project a S87 permit will not be required, but the investigation should be undertaken to the usual standards for a S87 permit. The investigation should be conducted in the manner discussed in *Section 7.5.2* of the Aboriginal Heritage Assessment (refer *Annex I*).

8 NON-ABORIGINAL HERITAGE

8.1 INTRODUCTION

A preliminary search of heritage databases, registers and inventories was undertaken as part of the line route selection (LRS) process (refer to *Annex A*). The LRS concluded that detailed heritage studies were only required for the potential impacts the Project may have on the heritage listed Mullumbimby and Lismore Power Stations as no other items of heritage significance would be affected by the upgrade. However, in the unlikely event of sub-surface construction disturbing archaeological relics (any deposit, object or material evidence 50 or more years old) all work likely to affect the site(s) must cease immediately and, in accordance with section 146(a) of the *Heritage Act (NSW) 1977,* the Applicant must ensure the Heritage Council of NSW is notified within a reasonable time of the discovery or location of any relics. Written notification should be forwarded unless the Applicant believes on reasonable grounds that the Heritage Council of NSW is aware of the location of the relic.

The heritage assessments for the Lismore and Mullumbimby Power Stations are summarised in the following sections with the complete assessments provided as *Annexes J* and *K* respectively.

8.2 MULLUMBIMBY POWER STATION

The heritage value of the Mullumbimby Power Station and the potential impacts that the Project may have on the power station have been investigated and a report titled *Mullumbimby Power Station – Heritage Impact Assessment* (ERM, 2008d) prepared (hereafter referred to as the Mullumbimby Power Station HIA). This report is summarised here and provided in full as *Annex J*. *Figure 8.1* provides a recent photograph of the Mullumbimby Power Station Building

Figure 8.1 View looking south of the Mullumbimby Power Station

8.2.1 Introduction

The Mullumbimby Power Station, completed in 1925 and commissioned in 1926, was the third hydro electric power station to be installed on the Australian mainland. The original power station supplied 280 Kilowatt (kW) of power to the townships of Mullumbimby, Byron and Bangalow. In due course the hydro turbines were supplemented by additional diesel powered engines to assist with increased energy demand. With changes in technology and demand beyond capacity, the Mullumbimby power station ceased full-time operation in 1988 and was decommissioned in 1989.

The Mullumbimby Power Station is identified on the Country Energy Heritage and Conservation Register (S.170 Register), the North Coast Regional Environmental Plan (REP) 1988, the Byron Local Environmental Plan (LEP) 1988 and the National Trust of Australia (NSW) Register. The inclusion of the site on the North Coast REP and the S.170 Register requires Country Energy to inform the Heritage Council of any alterations to the power station.

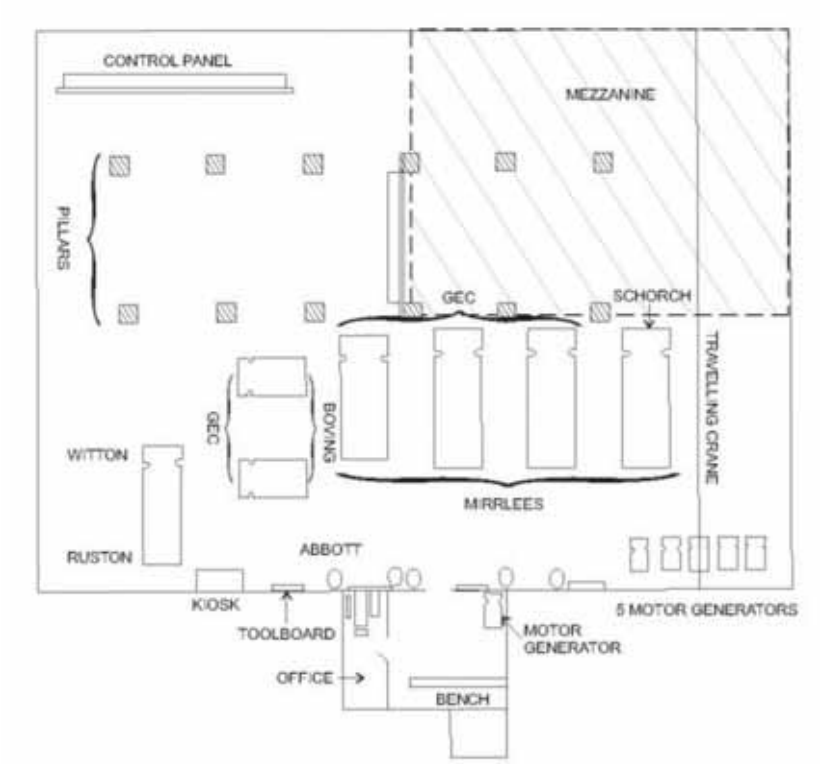
The Project includes an upgrade of the Mullumbimby substation. Available space for the upgrade is limited due to the physical constraints of the site. Two options were considered by Country Energy:

- permanent decommissioning and demolition of the Mullumbimby Power Station and relocation of internal plant to allow adequate room for the proposed upgrade; or

- retention of the Mullumbimby Power Station and reconfiguration of infrastructure to accommodate the proposed upgrade.

A feasible option to locate the new electricity infrastructure adjacent to the power station is preferred and this option allows for the retention of the Mullumbimby Power Station.

The power station building is a large double gabled shed comprising an office, control room and workshop containing hydro and diesel plant. A schematic plan of the internal layout of the Mullumbimby Power Station is shown in *Figure 8.2*.



(Source: Tanner & Associates, 1999, Not to Scale)

Figure 8.2 Mullumbimby Power Station building plan

8.2.2 Methodology

The Mullumbimby Power Station HIA was prepared in accordance with the NSW Heritage Branch, Department of Planning guideline *Statements of Heritage Impact*. The report contains information and analysis gained from:

- site investigation and physical analysis;
- research into the history of the site; and
- review of existing heritage listings.

The identification of heritage impact mitigation measures considers the heritage values of the site, need for the proposed works as part of a broader electricity supply upgrade along with the potential for future interpretation of the Mullumbimby Power Station.

8.2.3 Heritage Assessment

Despite signs of some corrosion and a lack of maintenance, the engines appear to be in remarkably good condition and present a clear image of the functioning station. The life expectancy of industrial plant in general is around 30 – 50 years and the engines at the Mullumbimby Power Station have reached the upper limit of this timeframe. When operations cease, mechanical parts begin to deteriorate through lack of use and will continue to deteriorate without cyclical maintenance to retard this

process. The cost of bringing the plant up to operational levels and ongoing maintenance can be high.

The power station building, while it is structurally sound, is in a generally poor condition with water pooling across the concrete floor from numerous leaks in the roof and walls. In addition, much of the façade consists of compressed sheeting containing asbestos. This is not an ideal heritage environment for the plant.

Comparative analysis of similar sites in Australia has confirmed that the Mullumbimby Power Station is an unusual and early example of a hydro-diesel electricity generation facility.

In New South Wales, the *Heritage Act 1977* has established seven criteria for the identification and assessment of heritage values. Assessment under the *Heritage Act 1977* showed that the Mullumbimby Power Station is significant at a State level for its role in the development of the area; its ability to demonstrate the principal characteristics of hydro-electrical power stations; for its historic associations with William Corin (a consulting hydraulic, electrical, mechanical and civil engineer associated with site selection and construction of the Mullumbimby Power Station); and for its importance to the Byron Shire community. The in-situ combination of hydro and diesel power general equipment, weir and race is unusual and is important in the technological development of power generation in NSW.

8.2.4 Impact Assessment

The proposed substation upgrade will result in some changes to the immediate setting of the heritage item though this is expected to have a limited effect on the heritage values of the site. Overall, retention of the power station and its equipment in-situ and the commitment to its ongoing conservation is a positive heritage outcome of the proposed upgrade Project.

The proposed Mullumbimby substation site configuration is illustrated on the general arrangement plan included in *Annex G*.

8.2.5 Mitigation Measures

The impacts of the proposed substation upgrade can be mitigated by:

- preparation of an archival recording in accordance with NSW Heritage Branch guidelines of the power station building and its associated machinery and equipment prior to the commencement of any site construction works; and

- lodgement of copies of the archival recording with the Brunswick Valley Historical Society, State Library of NSW and the NSW Heritage Branch to provide a readily accessible record for the community.

8.2.6 Conclusion

Provided the mitigation measures outlined in *Section 8.2.5* above are implemented the heritage values of Mullumbimby Power Station will not be adversely impacted by the Project.

8.3 LISMORE POWER STATION

The heritage value of the Lismore Power Station and the potential impacts that the Project may have on the power station have been investigated and a report titled *Lismore Power Station – Heritage Assessment* (ERM, 2008e) prepared (hereafter referred to as the Lismore Power Station HA). This report is summarised here and provided in full as *Annex K*.

Figure 8.3 View of the interior of the Lismore Power Station

8.3.1 Introduction

The Lismore Power Station was built in 1932 and marked the first stage in the extension of the Nymboida Programme for the supply of electricity in the Richmond River region. The original power station comprised an eight cylinder 1000 horsepower Davey Paxman crude oil engine imported from England and six diesel generators. The engine is noted as the only engine of its type built by the Paxman Company. Additional engines and diesel generators were progressively installed over the subsequent years to cope with the increase in electricity demand in the region. This included the installation of two Fullagar diesel engines in 1941. Designed in the 1920s, these engines are an unusual design having opposed piston type engines.

The Lismore Power Station building is identified on the Country Energy Heritage and Conservation Register (S.170 Register), the *Lismore Local Environmental Plan* (LEP) *2000* and the National Trust of Australia (NSW) Industrial Archaeology Register.

Options for the upgrade are being investigated and may include:

- possible reconfiguration and redesign of the site resulting in the relocation of bus and line bays, transformers and capacitor banks; and/or
- potential permanent decommissioning and demolition of the existing power station building and relocation of significant heritage items i.e. power generation equipment.

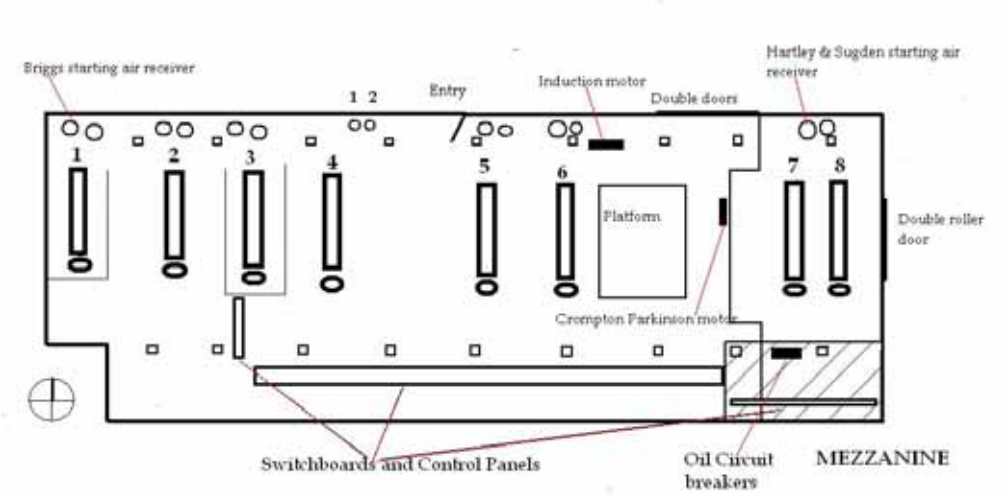
The original power station building has undergone several changes since its construction including an extension to the east and the installation (and subsequent removal in the 1990s) of cooling towers along the northern sides of the building. In

1966, the site was upgraded with the 132 kV line operating at 66kV and substation operating at 66kV. The last of the workers cottages was removed from the site in the 1990s.

The Lismore Power Station is located below the flood line and the engines have been affected by flood twice since original construction. In 1988-89 flooding affected engines on the lower level and was a key factor in the decommissioning of the plant.

The power station is a large steel and timber framed structure clad in asbestos cement sheet (fibro) with corrugated steel roofing sheets. The maintenance entry is via a large roller door in the west wall, while the main entry is via centrally placed single timber doors in the north and south elevations. The floor is steel trowelled concrete with in-built cable channels that have gatic steel covers.

The interior of the power station building comprises a large space containing workshop areas, an office extension in the west and a mezzanine floor in the northwest corner containing switchboards. The main control panels are along the south wall. Although the station is no longer operational, the plant comprising eight diesel generators is in-situ. A schematic plan of the internal layout of the Lismore Power Station is shown in *Figure 8.4*.



(Not to Scale)

Figure 8.4 Schematic rendition of the internal configuration of the Lismore Power Station

8.3.2 Methodology

The Lismore Power Station HA was prepared in accordance with the NSW Heritage Branch, Department of Planning guideline *Assessing Heritage Significance*. The report contains information and analysis gained from:

- site investigation and physical analysis;
- research into the history of the site; and
- review of existing heritage listings.

The Lismore Power Station HA will inform the options analysis for the proposed substation upgrade.

8.3.3 Heritage Assessment

Although the engines in the power station have not been operational for some years, they appear to have been maintained regularly during operation and appear to be in remarkably good condition. However, the life expectancy of industrial plant in general is around 30-50 years and the engines at the Lismore Power Station have either reached the upper limit of this timeframe or are nearing it. When operations cease, mechanical parts begin to deteriorate through lack of use and will continue to deteriorate without cyclical maintenance to retard this process. Although the plant appears to have been maintained they have not been operating on a continuous basis. The cost of bringing the plant up to operational levels and of ongoing maintenance could prove to be prohibitive.

While the power station building is structurally sound, there has been some damage to the fibro wall sheets and windows. Recent storms (May 2008) have resulted in hail damage to guttering which is heavily corroded along the southern and northern elevations. The steel frame and concrete slab floor are in sound condition.

Comparative analysis of similar sites in Australia has confirmed that the Lismore Power Station equipment is an unusual example of a diesel electricity generation facility. It has also identified that the building itself is not an unusual example of this type.

In NSW, the *Heritage Act 1977* has established seven criteria for the identification and assessment of heritage values. Assessment under the *Heritage Act 1977* showed that the Lismore Power Station is significant at a local level for its role in the development of the area; its ability to demonstrate the principal characteristics of electrical power stations of the 1930s and for its archaeological potential. Some of the original equipment, particularly the eight-cylinder Davey Paxman engine and the Fullagar engines, are significant at a State level as unusual surviving examples of 1920s era diesel engine technology.

A heritage values assessment confirmed that the Lismore Power Station including equipment has significant heritage value and that the current heritage listings for these items remain valid. The options analysis for the proposed Lismore Power Station site upgrade will need to appropriately consider these heritage values and address potential heritage impacts.

8.3.4 Mitigation Measures

The following recommendations are made regarding the options analysis for the proposed Lismore Power Station site upgrade:

- inclusion within the options analysis of a feasibility assessment for the retention of the Lismore Power Station building and associated equipment, tools, control panels and signage; and

- consultation during the preparation of the options analysis with an Industrial Archaeology specialist.

In addition, it is also recommended that if the decision regarding the future of the Lismore Power Station is deferred a Conservation Management Plan be prepared in the next 18 months to ensure Country Energy's *Section 170* obligations are met.

8.3.5 Conclusion

The Lismore Power Station confirmed that the former power station, including the equipment, has significant heritage values. The options analysis for the future upgrade of Lismore Power Station should appropriately consider these heritage values and address potential heritage impacts.

9 NOISE

9.1 BACKGROUND

The noise impact assessment (NIA) was conducted to identify potential acoustic impacts associated with construction and operational activities and has been conducted with reference to:

- *Industrial Noise Policy* (INP), Department of Environment and Climate Change (DECC) 2000;
- *Environmental Noise Control Manual* (ENCM), NSW EPA 1994; and
- AS 1055-1997 *Description and Measurement of Environmental Noise* Part 1, 2 and 3.

9.2 NOISE CRITERIA

9.2.1 Operational Noise Criteria

The DECC, in its INP, gives guidelines for assessing industrial facilities. Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development as outlined below.

Assessment criteria for sensitive receivers near industry are based on the following objectives:

- protection of the community from excessive intrusive noise; and
- preservation of amenity for specific land uses.

To meet these objectives, two separate criteria are prescribed by the DECC, namely the intrusiveness criteria and the amenity criteria. A fundamental difference between the intrusiveness and the amenity criteria is that the former is applicable over 15 minutes in any period, while the latter covers the entire assessment period (day, evening and night).

Assessing for Intrusiveness

The intrusiveness criterion requires that $L_{Aeq,\ 15min}$ noise levels from a newly introduced source during the day, evening and night do not exceed the existing Rating Background Levels (RBL) by more than 5dB. This is expressed as:

$$L_{Aeq,\ 15min} \leq RBL + 5 - K$$

where $L_{Aeq,\ 15min}$ is the L_{eq} noise level from the source, measured over a 15 minute period and K is a series of adjustments for various noise characteristics. Where the RBL is less than 30 dB(A), a value of 30 dB(A) is used.

Assessing for Amenity

The EPA's amenity criterion requires industrial noise to be within an acceptable level for the particular locality and land use. Where ambient noise is already high, the

acoustic environment should not be deteriorated significantly. The strategy behind the amenity criterion is a holistic approach to noise, where all industrial noise (existing and future) received at a given receptor does not exceed the recommended goals.

9.2.2 Project Specific Noise Criteria (PSNC)

The proposed substation noise emission criteria have been set in accordance with the INP. Given that noise generated by substations is generally constant over 24 hours the critical time period for noise emissions to meet relevant criteria is during the night time. For those substations identified as being located in areas experiencing low night time acoustic amenity, background noise levels were not measured and therefore assessment criteria has been set based on the INP minimum background level of 30dB(A). The PSNC for these substations is 35dB(A).

Due to likely elevated background noise levels from highway traffic, Project Specific Noise Criteria for Lismore South, Ballina and Ewingsdale substations were derived from long-term noise measurements logged at representative sensitive receptor locations near these substations. Details of noise measurements and derived PSNC for these substations are provided in the specific assessments in the relevant sections of this report.

9.2.3 Construction Noise Criteria

The DECC's current guidelines for construction (Environmental Noise Control Manual NSW EPA 1994) are described as follows:

Working Hours

Proposed construction working hours are based on guidance in Environmental Noise Control Manual (NSW EPA 1994) and include:

- Monday to Friday - 0700 hours to 1800 hours
- Saturday - 0800 hours to 1300 hours
- No work on Sundays or Public Holidays

Work outside these hours would be permitted if the work is inaudible at sensitive receptors.

The DECC's construction noise guidelines sets out methods for determining construction criteria associated with proposed developments. *Table 9.1* reproduces the construction noise correction above the rating background noise level (RBL) based on duration that applies to nearest sensitive receivers.

Table 9.1 Construction Noise Goals

Construction Period	Acceptable LA10 Noise Level[1]
4 weeks and under	Background LA90 plus 20 dBA
4 weeks to 26 weeks	Background LA90 plus 10 dBA
Greater than 26 weeks	Background LA90 plus 5 dBA

9.2.4 Derived Construction Noise Criteria

For transmission line construction and at those substations where background noise measurements were not recorded a conservative daytime background noise level of 5dB(A) above the adopted night time background level was assumed (i.e. 35dB(A)). The substation construction phase of this project is expected to occur near individual sensitive receptors over a period of between 4 weeks to 26 weeks in duration, whilst due to the rate of installation, the transmission line construction phase will be of a short-term (less than four weeks) duration in any particular location. Therefore the construction noise goals in these instances are set to background plus 10 dBA (LA90 + 10dBA = 45dBA) and plus 20dBA (LA90 + 20dBA = 55dBA) respectively.

9.2.5 Equipment Sound Power Levels

Dominant noise sources associated with operational substations include transformers and capacitor banks.

The sound power levels of this substation plant vary depending on capacity and manufacturer specifications. Sound power levels of modelled noise sources are detailed in each substation noise assessment below and are based on guidance in Australian Standard AS 1274.6 *Power Transformers Part 6: Determination of Transformer and Reactor Sound Levels* or from noise specifications provided by Country Energy.

9.2.6 "Modifying Factor" Adjustments

In accordance with *Section 4 'Modifying Factor Adjustments'* of the INP, sources that contain certain characteristics, such as tonality, low frequency noise or intermittency may result in a greater annoyance to the community. To account for this, the INP provides modifying factor corrections to be applied to such noise sources. Transformers and capacitor banks exhibit tonal characteristics at 50Hz and 100Hz that may meet guideline levels for tonality at sensitive receivers. Therefore, to provide a conservative assessment a modifying factor of 5dB(A) has been applied to the assessed noise levels for all assessed receivers at each substation.

9.3 BRUNSWICK HEADS

As the Brunswick Heads substation is only at concept stage no acoustic impact assessment has been undertaken at this stage. Detailed acoustic assessments will be completed prior to Project Approval for these substations.

9.4 SUFFOLK PARK SUBSTATION

The acoustic impact assessment for the Suffolk Park substation was prepared by MWH (*Annex Q*). The project involves the installation of a new 132/66/11kV zone substation within an existing rural environment.

9.4.1 Residential Receivers

The nearest residence to the site is approximately 360m to the south east with another approximately 435m to the north west. There is a proposal currently before Byron Shire Council for an artists retreat and eco – village on the former piggery site

to the east. If approved this could place sensitive noise receivers between 200m and 270m from the substation. The latter situation including the proposed artists retreat was modelled for the purposes of this assessment. The owners of the former piggery have expressed a concern about the future impact of the series of feeder lines that will be installed and their impact on the visual amenity of the valley as they are in the process of seeking development approval for an eco-village and artists retreat on the property. They have requested that the lines currently running down the eastern boundary be placed underground and have offered no contest to an easement for an access road through their property to service Site 7 (MWH 2008).

9.4.2 Noise Impact Assessment Results

The modelling results for construction noise indicates that the noise criteria will be exceeded during the daytime period under neutral weather conditions by up to 5dBA and up to 8dBA under worst case weather conditions without the utilisation of noise mitigation and management strategies. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that the management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

The operation noise modelling indicates that the operational noise will comply with the noise criteria at the nearest sensitive receiver during all periods and weather conditions.

9.5 LISMORE BULK SUPPLY POINT SUBSTATION

The project involves the installation of a new 132kV power line bay for the proposed new 132kV feeder to Ballina. No changes to transformers and capacitor banks are proposed.

9.5.1 Residential Receivers

Sensitive receivers surrounding the proposed substation are west and east in Three Chain Road and north west on Ruane Road, south east off Caniaba Road and south west off Nimoola Road, Lismore, NSW. *Figure 3.1* in the NIA *(Annex L)* identifies the nearest residential dwellings adjacent to the proposed substation.

9.5.2 Noise Impact Assessment Results

Calculations of noise emissions associated with the construction and upgrade of the proposed Lismore substation would not exceed the construction noise criteria. Modelled operational noise levels for the Lismore substation are expected to comply with the PSNC at all nearest residences to the proposed upgraded substation site.

9.6 LISMORE SOUTH SUBSTATION

The Lismore South substation is located on the Bruxner Highway in an area dominated by industrial land use. The project involves the long-term redesign of the substation resulting in the relocation of transformer bays and capacitor banks.

9.6.1 Sensitive Receptors

Closest receivers to the proposed substation are generally to the north in Union Street, north east and south east in Gundurimba Road, South Lismore, NSW. *Figure 4.1* in the NIA *(Annex L)* identifies the receivers closest to the substation.

9.6.2 Noise Modelling Results

Modelled operational noise levels of the proposed substation are expected to meet the relevant PSNC for all sensitive receivers during applicable meteorological conditions.

Calculations of noise emissions associated with the construction of the proposed Lismore South substation upgrade would exceed the construction noise criteria at the nearby receiver in Union Street. However, it is noted that this assessment did not consider intervening barriers such as the existing buildings within the substation site.

Further, the residence is located adjacent to the Bruxner Highway within an area dominated by industrial activity. Therefore, this assessment is conservative and it is considered that the potential for construction noise to impact on this residence is less likely. Nevertheless to minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

9.7 BALLINA SUBSTATION

The project involves upgrading the 66/11kV Ballina substation to a 132/66/11kV zone substation and includes the installation of new 132kV and 66kV power line bays and a new 132/66/11kV transformer. The existing 66/11kV infrastructure will be retained including transformers and capacitor banks.

9.7.1 Residential Receivers

Sensitive receivers surrounding the proposed substation are north in Vera Street, east in Temple Street and to the south in Canal Road. *Figure 5.1* in the NIA *(Annex L)* identifies the nearest residential dwellings to the substation.

9.7.2 Operational Noise Modelling Results

Modelled noise levels for the proposed substation upgrade without specific mitigation are expected to be above the relevant project specific noise criteria at several residences, therefore noise mitigation was incorporated into the noise modelling. The noise mitigation adopted for modelling was a 3.8 metre barrier along the northern and eastern perimeters of the site and the installation of a Stage 1 attenuation kit on the capacitor bank (10dB reduction).

The modelling results with mitigation indicate only minor exceedences with the only exceedences above 1dB predicted to occur at residences located to the east and south east during night time inversion events. These events are likely to be relatively limited within such a coastal location. Country Energy has advised that alternate options for mitigation could include one or a combination of the following:

- installation of a Stage 2 attenuation kit on the capacitor bank (additional 6dB reduction);

- installation of partial or full enclosure around the 132/66/11kV 75MVA power transformer;
- installation of partial or full enclosure around the 66/11kV 30MVA power transformers;
- construction of alternate barrier wall heights and locations (e.g. along the eastern portion of the southern compound boundary); and
- redesign of the substation placing plant with highest noise emissions further from sensitive receptors.

Given the large potential permutations of available mitigation options it is proposed that the most feasible and economic mitigation option be developed with the goal of achieving an overall sound power level for the substation site meeting the PNSC.

9.7.3 Construction Noise Modelling Results

Calculations of noise emissions associated with the construction and upgrade of the proposed Ballina substation would exceed the construction noise criteria. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

9.8 LENNOX HEAD SUBSTATION

The Lennox Head substation was recently constructed to accept 132kV though has to date only energised to 66kV. The project involves the replacement of existing 66/11kV transformers with 132/11kV transformers to allow energisation to 132kV.

9.8.1 Residential Receivers

Sensitive receivers surrounding the proposed substation are north and south in Newrybar Swamp Road, further south in Ross Lane and west in Glennross Drive. *Figure 6.1* in the NIA *(Annex L)* identifies the nearest residential dwellings adjacent to the proposed substation.

9.8.2 Noise Modelling Results

Modelled noise levels for the proposed Lennox Head substation upgrade are expected to comply with the PSNC at all residences surrounding the proposed upgraded substation.

Calculations of noise emissions associated with the construction of the proposed Lennox Head substation indicates noise levels will comply at all surrounding residences with the exception of the nearest residences to the south. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

9.9 EWINGSDALE SUBSTATION

The Ewingsdale zone substation was recently constructed to accept 132kV though has to date only energised to 66kV. The project involves the replacement of existing 66/11kV transformers with 132/11kV transformers to allow energisation to 132kV.

9.9.1 Residential Receivers

Closest receivers to the proposed substation are a single residence to the north on Ewingsdale Road and residences to the south east and south in Parkway Drive, Ewingsdale. *Figure 7.1* in the NIA *(Annex L)* identifies the nearest residential dwellings adjacent to the proposed substation.

9.9.2 Noise Modelling Results

Modelled noise levels for the proposed Ewingsdale substation upgrade are expected to comply with the PSNC at all residences surrounding the proposed upgraded substation.

Calculations of noise emissions associated with the construction of the proposed Ewingsdale substation upgrade would exceed the construction noise criteria. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

9.10 MULLUMBIMBY SUBSTATION

Mullumbimby substation currently includes a 132/66/11kV 75MVA and a 132/66/11kV 40MVA power transformers and a 132/66/11kV earthing transformer. The earthing transformer is not a significant noise source and the 40MVA power transformer is a spare and would only operate in the case of the 75MVA transformer being down for repairs or maintenance. The project involves the installation of a new 132kV power line bay for the proposed 132kV feeder to Ewingsdale via Brunswick Heads and the replacement of the two 132/66/11kV transformers with a 132/11kV transformer.

9.10.1 Residential Receivers

Sensitive receivers surrounding the proposed substation are north west, west and north east in Alidenes Road, east and south in Wilsons Creek Road. *Figure 8.1* in the *NIA (Annex L)* identifies the nearest residential dwellings adjacent to the proposed substation.

9.10.2 Noise Modelling Results

Modelled noise levels for the proposed substation upgrade are expected to comply with the PSNC at all residences adjacent to the substation site.

Calculations of noise emissions associated with the construction and upgrade of the proposed Mullumbimby substation upgrade would exceed the construction noise criteria at a number of residences surrounding the site. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that the management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

9.11 TRANSMISSION LINE ROUTE

9.11.1 Construction Impacts

Construction work will include as a number of activities including:

- existing conductor and pole removal;
- excavation of hole and installation of new pole;
- access by vehicles and machinery; and
- easement restoration and rehabilitation as the work proceeds.

These works will be undertaken with relevant plant progressively moving along the transmission line route. Due to the rate of installation, any noise impacts from the work will be of a short-term (less than four weeks) duration in any particular location.

Transmission line construction has the potential to occur are varying distances from sensitive receivers. Several distances have been assessed to quantify the potential impacts of transmission line construction with the inclusion of bored piling and trucking activities as outlined in Table 9.1 of the Noise Impact Assessment (ERM, 2008f) attached as *Annex L*.

Taking into consideration that overhead transmission line and cable installation is progressive and that not all equipment can operate at the same location, it is reasonable to assume that not all pieces of equipment would operate together at the closest location to a residence, therefore calculated noise levels should be considered as a worst case. Given this staggered construction method, low population density along the route and generally great distances to nearest residences, exceedences of noise criteria are considered unlikely in most locations. However, where distances to residences are less than 100 metres, mitigation measures detailed in *Section 9.13.2* be implemented as part of the construction process.

9.11.2 Transmission Power Line Operation

During transmission line operation there would be the emission of noise due to maintenance and repair works that may be audible at nearby sensitive receivers. This noise would be relatively rare at any one location and short-term in nature and forms part of maintaining an efficient and reliable essential service.

In addition, there is potential for some emission of noise due to the corona effect and wind noise. However, typically when conditions do exist which might result in audible noise due to these effects, background noise levels would also generally increase. This would result in the masking of the generated noise, minimising potential impacts on sensitive receivers. Corona and aeolian induced noise is not, therefore, expected to be a source of impact from the proposal.

No specific monitoring or mitigation measures are considered necessary.

9.12 CONCLUSION

The assessment concludes that noise emissions from the upgraded substations would meet the relevant criteria at the nearest residential receivers to each substation site. However, it was identified that noise mitigation measures would be required at the Ballina substation; with specific options modelled to indicate that compliance was attainable. The assessment also concluded that the operation of the upgraded transmission line is unlikely to result in a degradation of the existing ambient noise environment.

Construction noise at the substation sites and along the transmission line has the potential to impact on nearby sensitive receivers. These impacts though short-term can be reduced in many cases by the implementation of mitigation measures as detailed in *Section 9.13.2*.

9.13 RECOMMENDATIONS

9.13.1 Ballina Substation

To minimise impacts from the upgraded Ballina substation the following measures will be implemented:

- The final noise mitigation options included in the detailed design phase will be modelled by a suitably qualified acoustical consultant to confirm the substation once operational is predicted to meet relevant DECC noise criteria.

- Post construction noise monitoring will be undertaken by a suitably qualified acoustic consultant confirming noise levels actually generated by the upgraded substation. The consultants report will recommend any necessary additional amelioration measures to be carried out.

- Once commissioned a noise compliance monitoring report will be prepared by a suitably qualified acoustic consultant confirming noise levels generated by the upgraded substation comply with DECC's *Industrial Noise Policy* (2000).

9.13.2 Construction Impacts

To minimise the impacts of construction noise emissions on nearby residences during construction of the proposed Lismore to Mullumbimby electricity network upgrade it is recommended the following mitigation and management procedures be implemented:

- residents potentially affected by construction noise to be informed in advance that work to take place and is likely to generate some noise, with residents being kept informed of progress at regular intervals;
- consultation be undertaken with residents where works may be audible within particular residences;
- all construction activities will be restricted to the hours of 7:00am and 6:00pm Monday to Friday, 8:00am to 1:00pm Saturdays and at no time on Sundays or Public Holidays except:
  - any works which do not cause emissions to be audible at any nearby residential property;
  - the delivery of materials which is required outside these hours as requested by police or other authorities for safety reasons;
  - emergency work to avoid the loss of lives, property and/or to prevent environmental harm; and
  - any other work as agreed through negotiations between Country Energy and potentially affected noise receivers.
- construction in close proximity to residences be completed in as short a time frame as possible;
- where practical, pushing topsoil or fill to form earth mounds between the construction site and residences;
- where possible barriers should be placed nearest to plant equipment to maximise barrier attenuation;
- maximise the offset distance between noisy plant items and nearby noise sensitive receivers;
- avoiding any coincidence of noisy plant working together in close proximity simultaneously adjacent to sensitive receivers;
- minimising the occurrence of consecutive or ongoing out of hours works in the same locality;
- orienting noisy plant or equipment away from sensitive areas;
- carrying out loading and unloading away from noise sensitive areas, if loading near sensitive receiver's acoustic enclosures or barriers of a suitable height is constructed to minimise the noise impacts;
- should blasting be required, specific assessment should be undertaken regarding impacts to any nearby residences;
- monitor construction noise levels throughout the varying stages of the project to quantify potential impact at most sensitive residences; and
- the contractor must take reasonable steps to manage and control noise from all plant and equipment. Examples of appropriate noise management and control may include installation of acoustic silencers, low noise mufflers and alternatives to reversing alarms.

10 VISUAL AMENITY

10.1 INTRODUCTION

ERM has undertaken an assessment for the proposed Lismore to Mullumbimby Electricity Network Upgrade Project. The full Visual Assessment Report (ERM, 2008g) is provided in *Annex M*.

There is a range of transmission line infrastructure upgrades proposed for the Project. The majority of these works will be confined to within close proximity of the existing 66kV transmission line corridor. Where possible, existing timber poles will be retained and the head gear or insulators will be replaced. Some small variations from the existing alignment have been considered along the proposed route options for a new 66kV feeder line between Lismore South substation and the Lismore switching station.

There are several possible transmission line configurations that may be used along the transmission line corridor. Visually, there are three common configurations, Staggered, Vertical and Horizontal. These configurations can be seen in *Figure 10.1*.

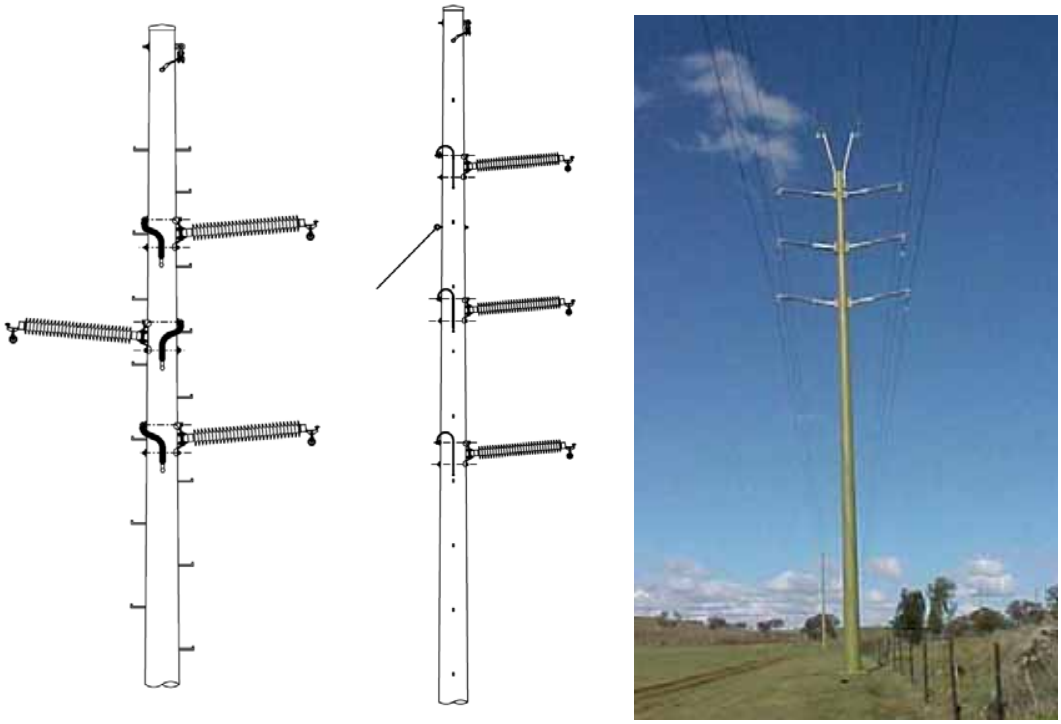


Figure 10.1 Transmission line configurations, staggered (left), vertical (middle) dual circuit (right), (Images Courtesy of Country Energy)

There may be subtle and technical variations to those the configurations shown in *Figure 10.1*, such as earth wire location and insulator length however, visually these will not be discernable to the untrained eye.

Other transmission line works include the construction of new underground power lines as well as undergrounding sections of existing overhead lines. Where overhead to underground infrastructure is installed the infrastructure at these locations can be visually bulky.

There are a number of visual elements that will occur during the construction, operation and ongoing maintenance of the transmission line upgrade. These would include:

- trench for excavation for 66kV and 132kV underground cables;
- access tracks; and
- construction machinery and temporary storage compounds.

The Lismore to Mullumbimby Electricity Network Upgrade begins at the Lismore bulk supply point substation to the west of Lismore and terminates at Mullumbimby terminal substation located on the Wilsons Creek Road west of Mullumbimby.

There are five existing substations located along the existing transmission line corridor that will form part of the proposed transmission line corridor upgrade. These are:

- Ewingsdale substation;
- Lennox Head substation;
- Ballina substation;
- Alstonville substation;
- Lismore South substation.

All of the existing substations are located behind a secure, visually permeable fence. They have visible electricity infrastructure entering and exiting site as well as behind the secure fencing. Some of these substations may see some visual change associated with the Project.

It is proposed to install two new communication towers, one located at the Mullumbimby zone substation and one at Lismore BSP substation involving the installation of an approximately 30m tall slimline concrete monopole supporting two antenna dishes. An example of the proposed tower construction is provided *in Figure* 10.2. A green pole will be used at Mullumbimby to minimise the visual impact against the surrounding hilly and vegetated backdrop.

(Source: Brewster Murray)

Figure 10.2 Example of slimline communications pole with dish antenna

There are two proposed new substations, one will be located near Brunswick Heads; and one located at Suffolk Park. The assessment of the new substation site near Brunswick Heads is to be completed at a later stage once final location and site layout details have been finalised.

10.2 VISUAL ASSESSMENT METHODOLOGY

The methodology used within the ERM visual assessment of the Project includes the following steps:

- **The Visual Components -** ERM have described the visual components of the transmission line upgrade. These include, but are not limited to, power lines and substations.

- **The Viewshed -** ERM have defined the viewshed of the transmission line upgrade, which has been based upon the parameters of human vision. The rationale behind the definition of the viewshed is appended to this report (Refer Annex M) which describes the parameters of human vision, and assists in defining the viewshed.

- **Landscape Units and Sensitivity -** ERM have defined Landscape Units for all potentially affected areas. Landscape Units are based on the physical characteristics of the area within the viewshed. The characteristics that assist in defining Landscape Units include geology, vegetation, topography and drainage patterns as well as the extent of human-modifications and urban development. The sensitivity of Landscape Units is primarily an assessment of the extent to which they can accept further change. Generally, the greater the extent of human-made modifications, the lesser will be the sensitivity.

- **Assessment of Publicly Accessible Viewpoints -** An assessment of the visual impact from indicative viewpoints within the public domain is partly based on photomontages that show views of the landscape and the possible alteration to these views as a result of the upgrade and its associated infrastructure. These photomontages assist in the analysis of the overall visual impact. The visual impact of a development is affected by:

  - the distance of the viewer from the development;

  - the nature of the surrounding landscape (including the Landscape Units represented and their sensitivity); and

  - the number of viewers able to see the development.

  Accordingly, the overall effect of the transmission line upgrade on each viewpoint has been assessed by evaluating the value of each of the above criteria, ranking them as being either low, medium, or high and, subsequently, making an assessment as to the overall effect by balancing each of the criteria.

- **Scale of Effects -** The overall visual impacts of the transmission line upgrade's built components from indicative publicly accessible viewpoints have been assessed using the following scale:

  - Negligible – minute level of effect that is barely discernable over ordinary day to day effects.

  - Low Adverse Effect – adverse effects that are noticeable but that will not cause any significant adverse impacts.

  - Moderate Adverse Effect – significant effects that may be able to be mitigated /remedied.

  - High or Unacceptable Adverse Effect – extensive adverse effects that cannot be avoided, remedied or mitigated.

- **Mitigation Measures for Publicly Accessible Viewpoints -** Mitigation measures are considered when they may be appropriate in reducing the visual impact from a publicly accessible viewpoint. For example, now roadside planting along a section of highway may significantly reduce the visual impact of the upgrade.

- **Recommendations -** Recommendations for the transmission line upgrade are based on the findings of this landscape and visual impact assessment.

10.3 LANDSCAPE AND VISUAL ASSESSMENT

10.3.1 Landscape Units

Landscape Units are based on areas with similar visual characteristics in terms of their ability to absorb visual change. Often the units relate to areas with similar environmental, geological and land use features. These Landscape Units have informed the landscape and visual impact assessment of the proposed upgrade. There were seven defined Landscape Units that have been identified within the viewshed for the proposed upgrade works. These are as follows:

- Landscape Unit 1 – “Flat to Gently Undulating Cleared Farmland”;
- Landscape Unit 2 – “Moderate to Steeply Undulating Cleared Farmland”;
- Landscape Unit 3 – “Forested Hills”;
- Landscape Unit 4 – “Riverine”;
- Landscape Unit 5 – “Wetlands”;
- Landscape Unit 6 – “Orchards”; and
- Landscape Unit 7 – “Townships”.

Figure 10.3 below provides a photographic example of *Landscape Unit 2* taken within the Project area.

Figure 10.3 Moderate to Steeply Undulating, Cleared Farmland

10.3.2 Viewshed

ERM has identified those areas that can potentially be visually affected by the proposed upgrade works. This area is called the viewshed. The viewshed of the proposed transmission line upgrade is based on the highest visual element which would be the 132kV powerlines. To ensure that this assessment is conservative, the viewshed was based on a scenario of power poles of between 17 m and 23 m in height.

The viewshed and the zones of visual influence within the viewshed that were used within the assessment of the transmission line route are set out in *Table 10.1*.

Table 10.1 Zones of Visual Influence within the Viewshed

Distance from an observer to the 66kV and 132kV powerlines	Zones of Visual Influence
>7 km	*Visually insignificant – outside the viewshed.* A very small element which is difficult to discern. Power poles will be invisible in certain lighting or weather conditions.
1.4-7 km	*Potentially noticeable, but will not dominate the landscape.* The degree of visual intrusion from this distance range will depend on the landscape sensitivity and the sensitivity of the viewer. However, power poles do not dominate the landscape.
0.7 - 1.4 km	*Potentially noticeable and can dominate the landscape.* The degree of visual intrusion, from this distance range will depend on the landscape sensitivity and the sensitivity of the viewer.
<0.7 km	*Highly visible and will usually dominate the landscape.* The degree of visual intrusion from this distance range will depend on the power pole placement within the landscape and factors such as foreground screening.

Note: 66kV and 132kV transmission line infrastructure may be visible at distances greater than 7 km. However, within landscapes that are disturbed, the ability for the casual observer to identify these at such distances is small.

The selection of publicly accessible viewpoints discussed in the *Visual Assessment Report* (*Annex M*) provides representative views for each of the Landscape Units discussed above. These viewpoints represent the range of likely landscape and visual impacts from publicly accessible locations within the viewshed. As such they provide a reasonable range of views on which to evaluate the likely visual impact of the current transmission line corridor on publicly accessible areas within the viewshed.

10.3.3 Landscape Sensitivity

Landscape sensitivity can be defined as the ability of a landscape to absorb visual change, and its visual influence thereof on the viewers. While change is an integral part of any landscape, development and infrastructure are significantly different to the natural processes that occur in a landscape.

Table 10.2 summarises the landscape sensitivity of each of the Landscape Units for the assessment of the landscape and visual impacts of the proposed upgrade.

Table 10.2 Landscape Sensitivity

Landscape Unit	Sensitivity	Comments
Landscape Unit 1 – "Flat to Gently Undulating Farmland"	LOW to MODERATE	This unit is obviously man-modified, contains other infrastructure, is not topographically dramatic and does not usually contain areas of water. It is a common landscape type in this area of New South Wales.
Landscape Unit 2 – "Moderate to Steeply Undulating Cleared Farmland "	LOW to MODERATE	The rolling hills of the hinterland are an attractive landscape type. They offer varying views back to the coast as well as views into Landscape Unit 1 – "Flat to Gently Undulating Farmland". They are also man-modified and contain other infrastructure.
Landscape Unit 3 – "Forested Hills"	MODERATE to HIGH	This unit is topographically varied and contains areas that appear natural. Forested hills occur primarily in State Forests, State Parks, Regional Parks and local reserves.
Landscape Unit 4 – "Riverine"	LOW to HIGH	Where the water courses are inland they are usually deeply incised into the landscape and difficult to access. In some areas, the watercourses are degraded – and little more than a drain. However, as the rivers, creeks and canals approach the coast; the riverine banks are shallower and become more accessible for recreation purposes.
Landscape Unit 5 – "Wetlands"	LOW to HIGH	Wetland landscapes occur in flat low lying areas, and are often surrounded by stands of large melaleuca scrub.
Landscape Unit 6 – "Orchards"	LOW	This unit is topographically varied and is often highly modified. These areas often occur in hilly landscapes.
Landscape Unit 7 – "Townships"	MODERATE	Views from residential townships are always important so there is an increased sensitivity. However, urban areas are also able to accommodate change as that is a regular occurrence within this Landscape Unit.

10.3.4 The Impact of Topography and Vegetation on Visibility

If views are not screened by vegetation, vertical development above the scale of the surrounding landscape is apparent. Landscapes with topographical variations have greater capacity to partially screen views to powerlines. However, this is largely dependent on the viewing location. At lower elevations topography may help to screen foreground views whereas at higher elevations views may be exposed. This relationship becomes more critical when topographical changes are small, such as within dune systems and gently undulating landscapes. In these areas, vertical development is difficult to screen without foreground screening measures.

In steeper areas the potential for screening varies according to the elevation of the viewpoint and the location of the power poles. At lower levels, views may be screened by foreground obstructions. However, at higher elevations views become more expansive.

10.3.5 Assessment of the Visual Impacts

The selection of publicly accessible viewpoints provides representative views for each of the Landscape Units discussed above. These viewpoints represent the range of likely landscape and visual impacts from publicly accessible locations within the viewshed. As such they provide a reasonable range of views on which to evaluate the likely visual impact of the current transmission line corridor on publicly accessible areas within the view shed. People view the landscape from publicly accessible locations. These include roads, tourist destinations as well as from public recreation areas (such as ovals and sporting grounds).

10.4 SUMMARY OF THE VISUAL IMPACT FROM PUBLICLY ACCESSIBLE VIEWPOINTS

ERM has assessed the visual impact of the proposed transmission line upgrade from 23 representative locations inclusive of each of the defined Landscape Units. The detailed description of these viewpoints is provided in the Visual Assessment Report (*Annex M*).

Table 10.3 provides a summary of the visual impact assessment ratings of all publicly accessible viewpoints as discussed in the Visual Assessment Report.

Table 10.3 Summary Assessment of Publicly Accessible Viewpoints

VP	Visual Component	Location	Distance from viewpoint	Overall visual impact
VP 1	Substation	Wilson's Creek Road	0.2 km	Low
VP 2	132kV	Coolamon Scenic Drive	0.2 km	Low
VP 3	132kV	Myocum Road	0.2 km	Low
VP 4	132kV	Residential Estate, Ewingsdale	0.1 km	Low - Positive
VP 5	132kV	Skinner Shoot	0.1 km	Low
VP 6	132kV and New Substation	Cnr. Bangalow Road and Coopers Shoot Road	0.6 km	Low - Moderate
VP 7	132kV	Newrybar Swamp Road	0.1 km	Low
VP 8	Substation	Newrybar Swamp Road	0.1 km	Low
VP 9	132kV	Pacific Highway north-west of Ballina	0.1 km	Low
VP 10	132kV	Pacific Highway, on the western edge of Ballina	0.7 km	Low
VP 11	Substation	Canal Road in Ballina	0.3 km	Low- Moderate

VP	Visual Component	Location	Distance from viewpoint	Overall visual impact
VP 12	Substation	Temple Street in Ballina	0.2 km	Moderate – Positive (Long-term)
VP 13	Substation	Jamie Place in Ballina	0.2 km	Low
VP 14	132kV/66 kV	Bruxner Highway near Alstonville	0.0 km	Low - Positive
VP 15	132kV/66kV	Ellis Road	0.0 km	Low
VP 16	Substation	Wardell Road / Gray's Lane	0.2 km	Low
VP 17	132kV/66kV	Tregeagle Road – Tregeagle Hall	0.3 km	Low
VP 18	132kV/66kV	Ellis Road	0.0 km	Low
VP 19	Substation	Three Chain Road	0.2 km	Low
VP 20	66kV Underground	Three Chain Road	0.1 km	Low
VP 21	66kV Underground/ Substation	Three Chain Road and the Bruxner Highway	0.1 km	Low
VP 22	66kV	Bruxner Highway west of Lismore	0.1 km	Low
VP 23	66kV	Gundurimba Road	0.0 km	Low

This summary shows that that there are two viewpoints that were considered as having a low-moderate negative visual impact from publicly accessible locations. All of the remaining viewpoints assessed have a low or positive visual impact.

This visual assessment provided for in the *Visual Assessment Report* (*Annex M*) is by no means exhaustive. The viewing locations have been selected to provide discussion of the range of visual impacts likely to be encountered for the proposed Lismore to Mullumbimby Electricity Network Upgrade.

Given that the transmission line is an existing part of the surround landscape for the most part of the proposed route alignment, the visual impact of the proposed upgrade is likely to be low in most if not all areas. There are also few houses in the proposed route corridor with the exception of entries to larger towns such as Ballina. The route also shares only short sections of local roads and highways.

10.5 MITIGATION

A range of options to reduce the visual impact of the proposed upgraded to the electricity network including variations to the existing alignment (i.e. strategic siting), undergrounding of transmission lines and landscaping including vegetation screening.

Country Energy will undertake measures to reduce visual impacts where required in accordance with those measures defined in *Section 7* of the *Visual Assessment Report* (*Annex M*). The measures to be undertaken will be confirmed during the easement negotiation and final design phase of the Project.

10.6 CONCLUSION

The Lismore to Mullumbimby Electricity Network Upgrade proposes to upgrade the existing electricity infrastructure within and existing transmission line corridor to support 132kV electricity infrastructure. There may be some route deviations along the length of the existing transmission line as well as pole location adjustments where new poles are installed within the existing corridor.

The landscape surrounding the proposed transmission line corridor contains many signs and types of electricity infrastructure including 11kV, 66kV and 132kV powerlines. In many areas there are also street lights and other poles.

Many of the existing substations along the route will see some level of visual change, however to the untrained eye this work will appear as routine maintenance of the infrastructure. The installation of communications towers at Mullumbimby zone substation and Lismore BSP substation will not significantly add to the visual landscape at these sites, which already contain other electrical infrastructure including a high concentration of transmission poles.

The proposed location of the new Suffolk Park substation is located in a low lying cleared area that is already highly modified and contains many large sheds and transmission line infrastructure. There are few residential properties that are oriented towards the new substation location. The majority of the existing residential dwellings in this location are surrounded by extensive tree canopy cover. If the visual impact of the proposed new substation in this location was considered to be of a high level of visual impact, then screening to the perimeter of the substation and within the affected residential lots will reduce the level of visual impact.

ERM understands that detailed visual assessment of the new substations to be located near Suffolk Park and Brunswick Heads will be undertaken once the final location and site layout has been determined for these sites.

A detailed landscape plan is to be developed for the Ballina substation site following the completion of the substation design.

Although there may be a noticeable visual change, the transmission line infrastructure is already part of the existing landscape in many areas. To most viewers, the level of visual change associated with the modification to the existing transmission line corridor will be negligible.

11 ELECTRIC AND MAGNETIC FIELDS (EMF)

Connell Wagner has prepared two reports about electric and magnetic fields (EMFs) titled *Lismore to Mullumbimby Electricity Network Upgrade: Generic Assessment of Transmission Line Electric and Magnetic Fields* (2008a) and *Lismore to Mullumbimby Electricity Network Upgrade: Generic EMF Assessment of Upgrade of a Zone Substation from 66kV to 132kV* (2008b), which assesses the electric and magnetic field (EMF) implications for the Project. These reports are summarised in this section and is provided in full as *Annex N and Annex O* respectively.

11.1 EMF AND HEALTH

Over the past 40 years, concerns have been expressed that the EMFs associated with electrical equipment might have adverse health effects. The issue has been the subject of extensive research throughout the world. To date, adverse health effects have not been established but the possibility that they may exist has not been ruled out.

11.1.1 Standards

The relevant Australian health standard has been the document called 'Interim Guidelines on Exposure to 50/60 Hz Electric and Magnetic Fields' (1989). The document was issued by the National Health and Medical Research Council (NHMRC) and was based on guidelines developed by the International Non-ionising Radiation Committee of the International Radiation Protection Association (IRPA). IRPA has since been replaced by the International Commission on Non-ionising Radiation Protection (ICNIRP). While the authors of the above guidelines considered the then epidemiological and laboratory studies regarding electric and magnetic fields and cancer, they considered that the available data did not provide any basis for health risk assessment useful for the development of exposure limits. The exposure limits in the guidelines are based primarily on established or predicted effects related to the flow of electric current within the body. They are not intended to define safe limits for possible health effects, should these exist, from fields at strengths normally found in the vicinity of electrical equipment.

In the case of magnetic fields, the guidelines stipulate a limit of 1000 milligauss for general public exposure for up to 24 hours per day. The corresponding limit for electric fields is 5000 Volts/metre (5kV/metre).

Because the NHMRC has not updated its guidelines since their original issue, they have lapsed and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is currently reviewing them. The ICNIRP guidelines, upon which the NHMRC guidelines are based, have been reviewed twice (1993 and 1999) and the 24-hour exposure limits for the general public remain unchanged (1000 milligauss and 5000 Volts/metre).

11.1.2 Prudent Avoidance

The practice of 'prudent avoidance' has been adopted by the Energy Supply Association of Australia (ESAA) and most Australian power utilities, including Country Energy.

Given the inconclusive nature of the science and the ongoing possibility of adverse health effects, it is considered that a prudent avoidance approach continues to be the most appropriate response in the circumstances. Under this approach, subject to modest cost and reasonable convenience, power utilities should design their facilities to reduce the intensity of the fields they generate, and locate them to minimise the fields that people, especially children, encounter over prolonged periods. While these measures are prudent, it cannot be said that they are essential or that they will result in any benefit.

11.2 ELECTRIC FIELDS

An electric field is a region where electric charges experience an invisible force. The strength of this force is related to the voltage, or pressure, which forces electricity along wires.

Electric fields are strongest close to their source, and their strength diminishes rapidly with distance from the source, in much the same way as the warmth of a fire decreases with distance. Many common materials - such as brickwork or metal - block electric fields, so they are readily shielded and, for all practical purposes, do not penetrate buildings. They are also shielded by human skin, such that the electric field inside a human body will be at least 100,000 times less than the external field.

11.2.1 Electric Fields and Substations

Being related to voltage, the electric fields associated with electrical equipment in substations remain relatively constant over time, except where the substation voltage changes.

As electric fields are readily shielded, items within substations such as metallic equipment enclosures and other structures act as shields from electric fields and therefore the only significant sources of electric fields within a substation are the exposed high voltage overhead conductors such as busbars. Therefore, with the exception of high voltage overhead lines entering or leaving the substation, electric fields external to a substation are negligible.

When the supply voltage at a substation is increased from 66kV to 132kV the electric fields associated with overhead lines and busbars will approximately double and, while the precise magnitude of the increase will depend on substation design, this will equate to a change from 10% to 20% of the relevant health guideline. Apart from the immediate vicinity of overhead lines entering and leaving the substation, the electric fields external to the substation will remain negligible.

11.3 MAGNETIC FIELDS

A magnetic field is a region where magnetic materials experience an invisible force produced by the flow of electricity or the current (amps). Because magnetic fields are related to the current rather than the voltage, high voltage equipment is not the only source of magnetic fields encountered in everyday life. In fact, modern life involves frequent contact with magnetic fields from a variety of sources such as appliances and electrical machinery.

The strength of a magnetic field depends on the size of the current (measured in amps), and decreases with distance from the source. While electric fields are blocked by many common materials, this is not the case with magnetic fields. This is one reason why power lines may contribute to the overall magnetic fields in the environment and why burying power lines will not necessarily eliminate these fields.

The magnetic field strength resulting from an electrical installation varies continually with time and is affected by a number of factors including:

- the total electrical load;
- the size and nature of the equipment;
- the design of the equipment; and
- the layout and electrical configuration of the equipment and its interaction with other equipment.

For an overhead line entering a substation or an overhead connection within a substation, the current flowing, the geometric configuration of the overhead conductors, the ground clearance and, where there are other circuits nearby, the "phasing" of the circuits in relation to one another determine the magnetic field. In the case of an underground cable entering, within or exiting a substation, the layout of the individual cables within the trench, the "phasing" of the individual circuits and the depth of burial can have a significant effect on the external magnetic fields.

11.3.1 Magnetic Fields and Substations

Every piece of substation equipment that carries electric current (amps) is a potential source of magnetic fields. Potential sources of magnetic fields include:

- incoming and outgoing overhead lines or underground cables;
- busbars and other overhead or underground connections within the substation;
- transformers;
- switchgear; and
- reactive plant.

As magnetic fields are caused by amps rather than volts the upgrade of a substation from 66kV to 132kV, while continuing to supply the same total load, will result in halving the current (amps) on the supply side, therefore reducing the magnetic fields surrounding the substation.

11.4 EMF AND TRANSMISSION LINES

The *Lismore to Mullumbimby Electricity Network Upgrade: Generic Assessment of Transmission Line Electric and Magnetic Fields* (Connell Wagner, 2008a) investigated five line sections within the Project Area that Country Energy predicted will be a representative sample of the more heavily loaded line sections including:

- Mullumbimby to Ewingsdale;
- Ewingsdale to Suffolk Park;
- Lennox Head to Ballina;
- Ballina to Alstonville; and Lismore to Alstonville.

It was found that the electric field under the 132kV transmission line will be less than 1kV/metre, reducing to 300volts/metre within 15 metres. These results are 20% and 6% respectively of the relevant guideline levels and therefore the electric fields were not assessed further within the report.

A number of specific sites were purposefully included in the magnetic field investigation, including:

- residential subdivision and proposed hospital at Ewingsdale;
- Skinners Shoot Road and Yagers Lane;
- Barlows Road in Ballina;
- House With No Steps, 253 Wardell Road, Alstonville; and
- A rural property, Muller Road, Alstonville.

The *Lismore to Mullumbimby Electricity Network Upgrade: Generic Assessment of Transmission Line Electric and Magnetic Fields* (Connell Wagner, 2008a) report found that the magnetic fields at the abovementioned locations will generally decrease once the 132kV line is commissioned or remain at negligible levels.

12 CONTAMINATED LAND

12.1 INTRODUCTION

This section of the report investigates the potential for impacts to contaminated land resulting from the proposed upgrade and construction of transmission lines and substations.

The following sections discuss relevant potential contaminated land issues associated with the proposed electricity network upgrade project.

12.1.1 Contaminated Soils – Power Poles

If soils are known or suspected to be contaminated and will be disturbed as a result of proposed network upgrade project they will be classified in accordance with the NSW DECC (2008) *Waste Classification Guidelines* prior to reuse, remediation and/or or off-site disposal.

It is noted that there is currently no clear guidance on the issue of managing potential soil contamination localized around the base of redundant treated timber power poles. However, if soil was to be removed off-site from the former power line corridor the above classification requirements would apply. It is currently standard industry practice to bury small volumes of potential impacted soils down hole following removal of the pole.

As sections of the proposed transmission line corridors are located in land identified as having potential for acid sulphate soil any excavation of such soils will require appropriate management. While only small volumes of soil would be expected to be generated at any pole replacement location they should still be managed in accordance with standard treatment practices (i.e. liming) prior to reinstating on-site or disposing off-site.

12.1.2 Substation Sites

Substation sites have the potential to cause soil and groundwater impacts due to the storage of transformer oils and historically PCB containing oils. The modern substation sites that are the subject of the Project are constructed with appropriately sized containment bunding around transformers and underground collection tanks to capture any potential leakage. It is noted that no recorded significant spill incidents have been recorded at the substation sites since recording began in 2003.

The previous redevelopment of the Mullumbimby substation involved the permanent decommissioning and removal of former fuel storage infrastructure that supplied the adjoining power station generators. Site remediation and validation assessment was undertaken in 2000. The existing substation was then constructed over the remediated land. The installation of proposed new substation infrastructure is to occur on undeveloped land to the west and up hydraulic gradient of the adjoining power station and substation sites. Therefore, these proposed upgrade works are not expected to encounter any residual soil and/or groundwater contamination.

Former aboveground fuel storage infrastructure at the Lismore South substation site, pertaining to the old power station, was permanently decommissioned some years ago. It is considered possible that the former historic power station may represent a potential source of soil and or groundwater impacts in the vicinity of the existing substation site.

The upgrade of existing substation sites at Ewingsdale, Lennox Head, Lismore South and the Lismore BSP substation is not expected result in the significant disturbance of site soils. The upgrade of the Ballina and Mullumbimby substation sites will involve the expansion of the site beyond the current compound boundary. Construction of the proposed new Suffolk Park substation will involve excavation of foundation and underground feeder line trenches. No known contamination is anticipated at the site (MHH, 2008), however road upgrade works to Yagers Lane will need to consider a nearby cattle dip. The potential for on-site contamination at the future site for the Brunswick Heads will need to be evaluated prior to developing the land.

12.1.3 Power Stations

The proposed upgrade of the Mullumbimby and Lismore South substation is not expected to result in the significant disturbance of any potentially contaminated soil materials related to the former power station activities. However, it is noted that the existing power station buildings are clad with asbestos cement sheet, which is observed to be damaged at some points around the buildings. Any redevelopment works at the substation sites may need to consider the appropriate management of such materials.

Any asbestos removal works should be conducted in accordance with *Occupational Health & Safety Regulation 2001* and with the *Code of Practice for the Safe Removal of Asbestos* [NOHSC 2002 (2005)]. On-site management of asbestos is required to be conducted in accordance with *Code of Practice for the Management and Control of Asbestos in Workplaces* [NOHSC: 2018 (2005)]. Country Energy has Policy and Procedural guidelines for dealing with the management and disposal of asbestos contaminating materials.

12.1.4 Cattle Dips Sites

A review of the NSW Department of Primary Industries (DPI) cattle dip site register for Northern NSW indicates that there are 89 known cattle dip sites in the Byron LGA, 82 in the Ballina LGA and 259 in the Lismore LGA. The available dip site mapping (not for publication) indicates that 16 sites are potentially located within 200m of the proposed 132kV and 66kV power line alignments. Six of these are potentially located within 50m. It is noted that the DPI have advised that the map grip coordinates provided for the known dip sites can have a potential error of up to 100m.

Two known former dip sites are located in close proximity to the new Ewingsdale substation site. A preliminary contaminated site investigation was carried out as part of the development approval for the approved substation site. The investigation found that the substation site was not classified as contaminated land and was suitable for the proposed site usage. Further consideration of potential site contamination was not considered necessary and, as such, no specific remediation measures were required. However, as underground feeder lines are proposed in and out of the Ewingsdale substation site, the location of the dip sites will need to be further considered. No dip

sites are known to be located in the immediate vicinity of the proposed Suffolk Park substation site.

There are no known cattle dip sites within in the immediate vicinity of the other substations that are the subject of this Environmental Assessment.

12.2 MITIGATION

Country Energy will consider site specific options for disposal and soil remediation (if deemed necessary) in relation to installation and removal of power poles based on likely site public accessibility, the sensitivity of the land or the potential for Acid Sulphate Soils.

While it is considered unlikely that cattle dip sites occur within the existing or proposed power line corridor Country Energy will ensure that any proposed excavation works (i.e. for pole replacement and new pole installation) within the existing and any new power line corridors do not disturb former dip sites. This will be assessed during construction using the using the DPI register and available mapping, and through direct consultation with relevant landholders. If it is considered possible that a dip site could potentially be impacted by the development, an alternative route deviation will be considered.

Asbestos materials will be appropriated managed in accordance with Country Energy's policy and procedural guidelines which meet the requirements of the relevant regulatory requirements.

13 CONSTRUCTION IMPACTS

13.1 PROPOSED CONSTRUCTION ACTIVITIES

13.1.1 Upgrade of Transmission Line Infrastructure

An assessment of the current infrastructure will be undertaken on a pole by pole basis to determine the capability of the existing poles to support the additional weight and tension of the 132kV transmission line. Following determination the existing poles will either be utilised or replaced with concrete power poles. Typically, these poles will be placed 150m to 300m apart. Areas of existing underground transmission lines will be utilised, with the upgraded line to be installed within the existing underground conduit.

The existing alignment will be utilised as much as possible. However, in sensitive locations, deviations are proposed to achieve better environmental, social and economic outcomes.

The construction process involved in the transmission line upgrade will require minimal vegetation disturbance that is limited to the small area proposed for the new pole or surrounding the base of existing poles. The holes are to be bored using a truck mounted drill rig. The dimensions of the holes are to be one metre in diameter and three meters deep. Following erection of the pole the foundation will be backfilled with concrete.

Some minimal clearing may be required in sections for new transmission line easements. Any vegetation that is removed will be mulched and used for erosion and sediment control within the transmission line corridor.

Transmission poles that are to be replaced will be removed carefully to ensure that any potential contamination risk posed by Copper Chrome Arsenate (CCA) or Creosote treated bases is appropriately managed. Two methods will be utilised in the removal of the poles. The first method involves cutting off the base of the pole and burying it in-situ in the hole from where it came. The second involves cutting off the base of the pole prior to disposal to an appropriately lice4nces landfill. The untreated section of the cut poles can be used for landscaping purposes or disposed to landfill. The removal and disposal of poles will be undertaken in accordance with Country Energy CEM7022 *Environmental Operations Manual*.

Temporary site compounds will be established along the transmission line route within the existing corridor to enable the storage of transmission poles and electrical infrastructure (i.e. cable, insulators and mountings). These will be temporarily fenced off and will be progressively moved on as the transmission line is constructed. These sites will be returned to their original condition once work has completed in that area.

13.1.2 Installation of Underground Transmission Line

The installation of underground transmission lines is proposed at some locations to reduce the impact on visual amenity or to provide for a more reliable and safe energy supply. Excavation of trenches for laying conduit would be done using standard excavation techniques. Sand or stabilised sand would be delivered to the site from local suppliers or supplied from an on-site batching plant and installed into trenches via appropriate trucks. The trenches are then re-instated and compacted with a front end loader and excess spoil would be disposed on-site where possible, which would generally be spread around during trench reinstatement. Any additional excess spoil would be removed from site reused for landscaping purposes or disposed to landfill.

13.1.3 Substation Construction

The Project includes the construction two new substation sites. The main construction activities for developing these substations will be:

- site establishment and access;
- site scrubbing and vegetation removal;
- foundation excavation and construction of a hardstand pad;
- construction of appropriately designed bunding and oil containment devices for transformers as per standard Country Energy practice;
- construction of sealed surfaces both concrete and asphalt as required;
- construction of buildings;
- installation of electrical infrastructure;
- fence construction; and
- site commissioning.

The substations will be designed and constructed to ensure site buildings, switching equipment and transformer bunds are above the local 1:100 year flood level.

The proposed locations of the two substations to be constructed are in relatively remote locations where impacts to the few surrounding rural residents will be minimal.

13.1.4 Upgrade of Existing Substations

Existing substations along the route are to be upgraded from 66kv to 132kV capabilities. In the case of the Lismore BSP substation and Lismore South, Ewingsdale and Lennox Heads zone substations this will generally involve replacing existing infrastructure with modern/refurbished equipment and extensions to existing or installation of new bus lines within the current site boundaries. No significant excavation activities will be required.

The upgrade of the Mullumbimby and Ballina zone substation will involve expansion outside the current substation bounds and will therefore require similar construction activities as those discussed for new substations above.

13.2 POTENTIAL ENVIRONMENTAL IMPACTS

Implementation of mitigation measures that have been identified for the environmental impacts discussed in the following sections will be detailed in a Construction Environmental Management Plan (CEMP) prepared prior to the commencement of construction activities.

13.2.1 Traffic

The proposed line route spans several kilometres incorporating a number of built up areas along the east coast including Lismore, Ballina and the outskirts of Byron Bay and Alstonville. The proposed route crosses and runs adjacent to both the Bruxner Highway and the Pacific Highway. Sub-arterial and collector roads are encompassed by the proposed line route including:

- Old Pacific Highway;
- Bangalow Road;
- Dunoon Road;
- Eltham Road;
- Coolamon Scenic Drive;
- Wyrallah Road;
- Skinners Shoot Road; and
- Ewingsdale Road.

The line also encounters railway infrastructure, crossing the currently unused Casino-Murwillumbah Railway Line at Suffolk Park.

Potential Traffic Impacts

Traffic generated by the project from the following activities:

- construction personnel moving to and from the site;
- earth moving equipment moving to and from the site;
- delivery of construction materials/removal of old infrastructure and waste; and
- ongoing line and easement maintenance activities.

The temporary nature of the majority of the construction activities will not have long-term impacts on traffic generation. Temporary traffic delays may arise as a consequence of significant construction activities, such as the importing of transformers to substations. The majority of line installation activities will be undertaken within existing easements. Vehicles and construction equipment traffic within these easements will be minimal and the progression of works will mean that any traffic generated will only be of short duration. Any works to be undertaken outside of the existing easements will be negotiated with landholders prior to commencement.

Mitigation Measures

The following mitigation measures will be implemented to minimise the potential impacts generated by the network upgrade:

- minimal clearance heights above road surface to be adhered to in all line upgrade and construction;
- utilise construction techniques that allow for the erection and ongoing maintenance of the lines to be carried out with minimal disruption to traffic;
- a Traffic Management Plan is to be prepared in the event of unavoidable traffic impacts, including any relevant requirements in the RTA's *Traffic Control at Worksites* (2008);
- any impacts to traffic will be scheduled for less busy periods to minimise delays;
- consultation to occur with landholders regarding preferred access routes for works to be undertaken on private property; and
- before construction activities commence, Council and RTA to be notified of heavy vehicle movements to sites and details of traffic control measures.

13.2.2 Air quality

The various land uses surrounding the Project Area contribute to the current air quality conditions. Within the Project Area, air quality is affected by:

- vehicle emissions from the significant roadways and built up areas;
- dust production from construction activities within the built up areas;
- dust production and pesticide application from agricultural activities; and
- emissions from light industry.

Potential Impacts

The construction phase has the potential to cause air quality impacts by the generation of dust during excavation activities and the placement of fill products. The operation of excavation equipment and vehicles will potentially impact air quality from the emissions of particulate matter and gaseous pollutants. Fugitive dust may also be generated from unsealed and non-vegetated areas.

The installation of the line is unlikely to cause significant impacts to air quality due to the nature of the installation process. Upgrading the existing substations is also not likely to significantly impact on air quality where excavation works will not be required as existing foundations will be utilised.

The development of the new substation sites and expansion of existing sites is the most construction intensive aspect of the Project and has the potential to impact on surrounding air quality. Mitigation measures will be implemented to ensure that emissions from construction plant is minimised and that fugitive dust is prevented during the construction of the substations.

Impacts generated by the proposed construction activities are expected to be minimal due to the temporary nature of the works and low intensity of construction activity near residential areas.

Mitigation Measures

Mitigation measure to minimise adverse air quality impacts from construction activities include:

- all trucks containing soil/gravel material are to be kept damp and covered during transportation;
- dust generating activities will be limited during unfavourable conditions and dust suppression measures (i.e. water cart) will be used where deemed necessary;
- all equipment will be maintained and operated in accordance with manufacturer specifications; and
- areas susceptible to dust generation are to be revegetated or sealed.

It is required that the construction phase be carried out in accordance with the relevant sections of the *Protection of the Environment Operations Act 1997*, which states that all equipment should maintained and operated in a proper and efficient manner.

13.2.3 Noise

A detailed Noise Impact Assessment (NIA) (ERM 2008f) is provided as *Annex L*. The NIA included a detailed assessment of construction noise impacts due to the network upgrade works.

The existing acoustical environment along the route is generally dominated by traffic noise in the built up areas and alongside major roadways and agricultural activities. Other noise sources are typical of a rural area including local traffic and machinery, wind in vegetation and birds.

Potential Impacts

The noise impacts generated from the installation of the new line will result from hole boring, trenching and truck movements. As the line installation activities are progressive the exposure to potential noise impacts by any sensitive receiver will be of short duration (less than 4-weeks). The progressive nature of the works indicates that not all equipment can operate at the same location; hence it is reasonable to assume that not all pieces of equipment would operate together at the closest location to a residence.

Given this staged construction method, low population density along the route and generally favourable distances to nearest residences, exceedences of noise criteria are considered unlikely in most locations. However, where distances to residences are less than 100 metres, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

The substation construction phase of this project is expected to occur near individual sensitive receptors over a longer period of between 4 weeks to 26 weeks in duration. The NIA identified that noise emissions associated with the construction and upgrade of a number of the substations would exceed the construction noise criteria. To minimise the potential acoustic impacts of construction activities on nearby residences, it is recommended that management and mitigation activities detailed in *Section 9.13.2* be implemented as part of the construction process.

13.2.4 Water Quality

The existing transmission line travels over several significant waterways and drainage lines. The major waterways coming into contact with the line are:

- Wilson River;
- North Creek Canal; and
- Duck Creek.

Potential Impacts

The proposed transmission line upgrade does not involve any activities within rivers or remnant vegetated riparian zones of any of the aforementioned waterways. Construction that may alter surface water flows and hydrology are not scheduled for the project. Therefore, direct impact to water quality is not expected. Despite impacts being unlikely, all works will be carried out in accordance with Country Energy's CEM7022 *Environmental Operations Manual.*

Sedimentation is a potential threat to surface waters in the project area as a consequence of erosion from exposed soil surfaces. The majority of excavation activities will be confined to the base of poles but larger earthworks, such as those involved in the development of the new substations, may require considerable attention.

Surface and groundwater has the potential to be impacted by oil leaks/spills from transformers. To avoid potential hydrocarbon contamination all transformers are bunded and drained to an oil/water separator tank. The tanks are monitored and serviced as required by suitably qualified personnel.

Chemical spills, including lubrication oil leakage from machinery, has the potential to result in hydrocarbon contamination of soils, groundwater and downstream watercourses. The potential for spills is minimised through the adoption of mitigation measures described below, which reduce the risk of spills whereby further consideration is not required herein. Appropriate spill containment kits or materials will be available at all substation sites during construction and ongoing during operation.

Mitigation Measures

Mitigation measures to minimise potential impacts on water quality are:

- all oils, fuels, lubricants and chemicals associated with plant operation in the easement should not be stored for extended periods;
- all refuelling and hardstanding areas, if required, should also be bunded to reduce water contamination from runoff;
- where possible, all machinery should avoid streambed areas at all times, ensuring natural buffer areas are present to waterways; and
- all works will be carried out in accordance with Country Energy's CEM7022 *Environmental Operations Manual.*

13.2.5 Erosion and Sediment Control

Controls will need to be implemented as the project progresses throughout the construction phase. The objective of these controls will be to:

- prevent erosion;
- limit the movement of sediment; and
- remove sediment from runoff.

The control measures are to be put in place prior to any construction activities disturbing the soil. The underlying principle of implementing the control measure before construction activities is that it is more environmentally sound, more cost effective and easier to prevent erosion than to concentrate on trapping the sediment following entrainment.

Mitigation Measures

Erosion and Sediment control measures to be implemented will include:

- disturbance of soils to be kept to minimum;
- sediment fencing to be constructed around stockpiled soil;
- exposed areas susceptible to dust generation are to be revegetated with fast growing grasses or sealed;
- dust generating activities will be limited during unfavourable conditions and dust suppression measures (i.e. water cart) will be used as required;
- all trucks containing soil/gravel material are to be kept damp and covered during transportation;
- where possible, all machinery should avoid streambed areas at all times, ensuring natural buffer areas are present to waterways; and
- all works will be carried out in accordance with Country Energy's CEM7022 *Environmental Operations Manual.*

14 WASTE MINIMISATION AND MANAGEMENT

14.1 INTRODUCTION

This section investigates the expected waste generation and subsequent waste management for the Project. Opportunities for waste recycling and reuse are identified, as well as methods of disposal for waste streams that cannot be effectively reused.

Resource NSW is a state government agency responsible for initiating waste avoidance and resource recovery strategies as a method of ensuring ecological sustainability.

The objectives of these schemes are to:

- minimise the consumption of natural resources;
- encourage resource recovery, including reuse, recycling and energy recovery;
- provide for continual reduction in waste generation; and
- minimise the final disposal of waste.

The NSW Waste Management hierarchy will be incorporated into the waste reduction and resource recovery strategies for the Project. The hierarchy is formed on the principles: avoid, reuse, recycle/reprocess, and dispose.

14.2 POTENTIAL IMPACTS

The operation of the proposed upgraded electricity network and substation sites would not routinely produce significant amounts of waste. However, during construction specific waste streams will require management.

The Project will involve the handling and production of waste from as number of sources, including:

- small amounts of vegetative matter from the maintenance of the existing transmission line corridors and minor clearing where necessary of new transmission line corridors;
- general construction waste - construction would generate general construction waste such as excavated soil and rock, brick, concrete, paper, plastics and metal;
- old power line cables and off-cuts from new power line cables;
- old power line insulators and related metal infrastructure;
- old transformers and transformer oils;
- packaging wastes from new infrastructure (such as cable reels);

- old timber transmission poles that may include contaminated materials from timber treatment processes;

- potential contaminated soils - small volumes of potentially contaminated excavated soil around the base of existing treated timber power poles; and

- general waste produced by construction personnel.

There is not expected to be any on-site maintenance of construction equipment.

The *Protection of the Environment Operations Act 1997* (POEO Act) makes it an offence to *'without lawful authority, wilfully or negligently dispose of waste in a manner which harms or is likely to harm the environment*'. Accordingly, the requirements of the POEO Act will be met during the construction works.

14.3 MITIGATION MEASURES

The management of all general and construction waste will be undertaken in accordance with Country Energy CEM7022 *Environmental Operations Manual.* Country Energy also has a number of specific Procedural Guidelines for managing specific waste types such as, acid sulphate soils, potential PCB wastes and contaminated soils. These will form the basis of Country Energy's Waste Management Planning for the project.

All wastes will be classified, stored and disposed in accordance with the NSW DECC (2008) *Waste Classification Guidelines*. Opportunities for waste reduction and the beneficial reuse of materials will be identified in accordance with Country Energy's obligations with regard to the *Waste Avoidance and Resource Recovery Act 2001*. This will also include the appropriate segregation of materials for recycling to divert such material from the general waste stream.

The following specific waste management techniques will apply to the upgrade and construction of new transmission lines:

- where possible grass and topsoil will be set aside and reused to establish groundcover to reduce the potential for erosion;

- vegetation removal would be undertaken in accordance with Country Energy's CEM7022 *Environmental Operations Manual.* Where possible removed vegetation will be mulched and reuse for site stabilisation and/or landscaping purposes;

- concrete and timber (i.e. pole butts) will be assessed in accordance with the above guidelines and where suitable for reuse returned to the excavation in accordance with industry practice and CEM7022 *Environmental Operations Manual*.

- materials deemed unsuitable for in-situ reuse would be appropriately stored, disposed or recycled off-site;

- if contaminated materials are encountered during construction (i.e. potential PCB containing transformers) work will stop until such time as the material can be classified and/or appropriate waste management measures put in place.

The following specific waste management techniques will apply to the upgrade and construction of new substation sites:

- no on-site maintenance of construction equipment unless disposal of any wastes generated is undertaken;
- vegetation removal would be undertaken in accordance with Country Energy's CEM7022 *Environmental Operations Manual.* Where possible removed vegetation will be mulched and reuse for site stabilisation and/or landscaping purposes;
- any construction staff amenities would be serviced by a licensed liquid waste contractor as required;
- skip bins or other containers will be used on-site for the collection of general waste. An appropriately licensed waste contractor will collect such general waste;
- any asbestos waste will be managed in accordance with Country Energy's policy and procedural guidelines which meet the relevant regulatory requirements;
- in the event of any oil waste occurring on-site, this would be collected and transported to the nearest oil recycling facility; and
- if contaminated materials are encountered during construction (i.e. potential PCB containing transformers) work will stop until such time as the material can be classified and appropriate waste management measures put in place.

15 CLIMATE CHANGE

15.1 INTRODUCTION

It is currently understood that activities undertaken by humans, particularly the burning of fossil fuels, is contributing to increasing the concentration of greenhouse gases within the earth's atmosphere. The heat that is radiated by the earth's oceans and land mass then becomes trapped by the greenhouse gases in the atmosphere, therefore increasing temperatures on earth. The increase in the earth's temperature has effects on the intricate web of life on earth and alters weather patterns, ocean currents and the distribution of plant and animal species.

15.2 GREENHOUSE GAS EMISSIONS

Greenhouse gases include:

- Carbon Dioxide (CO2);
- Carbon Monoxide;
- Oxides of Nitrogen (NOx); and
- Non-methane Volatile Organic Compounds (NMVOC).

Greenhouse gas emissions can be considered based on three scenarios:

- Scenario 1 (direct emissions) – are greenhouse gas emissions produced from sources within the boundary of a project and as a result of that projects activities;
- Scenario 2 (indirect emissions from consumption of energy) – are greenhouse gas emissions generated from the production of electricity, heat or steam that a project consumes, but which is physically produced by another facility; and
- Scenario 3 (other indirect emissions) – are greenhouse gas emissions generated in the wider economy that are related to a project, which are physically produced by another facility.

15.2.1 Scenario 1 Emissions

Scenario 1 emissions arising from the Project include those from vehicles and machinery used for earthworks for substation construction, vehicles transporting substation equipment, excavation for poles, transportation of electricity line replacement equipment (such as poles, conductors and insulators) and once the network is operational, emissions from vehicles used during inspections and maintenance of the electricity network.

15.2.2 Scenario 2 Emissions

The Project will not itself cause large amounts of *Scenario 2* emissions but it will allow businesses and homes in the Far North Coast region to consume electricity and therefore produce more *Scenario 2* emissions. *Scenario 2* emissions associated with the projected include the consumption of electricity to run office equipment.

15.2.3 Scope 3 Emissions

Scenario 3 emissions are associated with the Project however the proposed work will not change the demand for electricity in the region though it will ensure a safe, efficient and reliable supply. The *Scenario 3* emissions associated with the project will be from the businesses and houses that are connected to the electricity network.

Country Energy understands the importance of reducing greenhouse gas emissions which is why programs such as 'countrygreen' and research and development of renewable energy sources are supported by the company. The 'countrygreen' program allows customers to opt to use power from accredited renewable sources which Country Energy purchases on the customers behalf. The renewable energy areas where Country Energy is assisting in research and development include solar energy, wind farms, hydro power, carbon sequestration, biomass and wave and tidal power.

15.3 PRACTICAL CONSIDERATION OF CLIMATE CHANGE

The document entitled *Practical Consideration of Climate Change* accompanies the *New South Wales Floodplain Risk Management Guidelines* developed by the DECC. This document provides advice in considering climate change in managing potential flood risk by:

a) Assessing climate change impacts through modelling sensitivity analysis;

b) Determining whether climate change is a key issue at a particular location. This depends upon the impacts on flood damages and increased frequency of exposure of people to flood hazards;

c) Incorporating climate change in floodplain risk management plan development considerations and in new and current works projects and planning strategies; and

d) Outlining some potential climate change management strategies for existing and future development and associated practical issues.

There are two considerations arising from this document with regards to the proposed Lismore to Mullumbimby electricity network upgrade. These are:

- climate change induced variations in flood planning levels; and
- climate changed induced variations to surface water management methods.

15.3.1 Variations in Flood Planning Levels

The abovementioned document contains consideration for development of floodplain areas with regard to the potential for flood levels to increase as a result of climate change induced sea level rise and meteorological fluctuations may potentially impact on infrastructure including substations in flood prone areas.

Where possible, the proposed upgrade works are in areas outside those affected by flooding. Where this is not possible, infrastructure will be installed to ensure that it will not be affected by 1 in 100 year flood events. The electricity network upgrade is intended to meet the needs of the region for between 25 and 30 years. After this time the network will be reassessed to determine if modifications to the electricity network are necessary due to flood level changes.

15.3.2 Variations in Surface Water Management Methods

Climate change impacts on flood producing rainfall events demonstrate a trend for larger scale storms (rainfall totals for the 40 year average recurrence interval (ARI) 1 day storm events) tend to increase by 2030 and 2070. The document indicates that the variations for the Northern Rivers Catchment Area are between -10% and 5% for 2030, and up to between 5% and 10% for 2070.

The proposed electricity transmission network upgrade is intended to meet demands for the next 25 to 30 years when it will be reviewed and augmented on the basis of community needs and environmental changes, such as variations in surface water volumes. In this time the *Practical Consideration of Climate Change* document estimates that variations in surface water levels in the Northern Rivers Catchment Area will be between -10% and 5%. It is considered that the proposed electricity network will not be affected by the projected variation to surface water to 2030.

15.4 MITIGATION MEASURES

To minimise greenhouse gas emissions, and therefore reduce Country Energy's contribution to climate change, the following mitigation measures are proposed:

- Country Energy will continue to support programs such as 'countrygreen' and research and development of renewable energy sources;
- vehicles and machinery will be maintained in accordance with manufacturers requirements and regularly serviced to ensure optimal performance;
- all machinery noted to be producing excessive emissions will be stood down for maintenance; and
- where practical, vehicles and machinery not in use will be turned off.

16 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The Brundtland Report *Our Common Future* defines ecologically sustainable development (ESD) as:

> *'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'*

The main aim of ESD is to ensure that current and future generations leave a natural environment that functions as well or better than the one inherited. This proposal addresses meeting society's needs through the provision of an essential service, while maintaining a balance with the potential impacts on the physical and social environment of the Far North Coast area. Each of the principles of ESD is considered in the following sections.

16.1 PRECAUTIONARY PRINCIPLE

16.1.1 Interpretation

Section 6(2)(a) of the *Protection of the Environment Administration Act 1991* defines the precautionary principle to mean that if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

This principle was developed in response to one of the great difficulties of interpreting scientific data. The scientific method produces results based on confidence limits. These are controlled by the scope of data acquisition, interpretation methods and general understanding within a particular scientific discipline of a particular phenomenon. This has been used as a way of validating a lack of response to a potential threat of serious or irreversible environmental degradation.

The precautionary principle should be applied by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- an assessment of the risk-weighted consequences of various options.

ESD requires that uncertainty and the associated risk level be considered in decision making. However, the precautionary principle is only to be applied when two thresholds are met, namely:

- where there is a threat of serious or irreversible environmental damage; and
- where there is scientific uncertainty as to the nature and scope of the threat of environmental damage.

16.1.2 Justification

The environmental consequences of the Project have been assessed as accurately as possible using appropriate specialists in relevant disciplines where required. The assessment process involved computer modelling, field validation, scientific analysis and interpretation of the individual and cumulative environmental impacts of the proposed development. This process has enabled the impacts of the proposed upgrade to be predicted with a reasonable degree of certainty. All predictions, however, contain a degree of uncertainty, which reflects the variable nature of the environment. Where there has been any uncertainty in the prediction of impacts throughout the assessment process, a conservative approach was adopted to ensure the worst case scenario was predicted in the assessment of impacts.

The precautionary principle was specifically applied for the assessment of potential EMF impacts (refer *Chapter 11*). The potential impacts of EMF relating to the proposed transmission line and substation works have been quantified and mitigation measures (i.e line route selection) have been considered to minimise same. These have been provided as precautionary measures despite the lack of consensus within the scientific community as to the potential effects of EMF on human health.

The assessment of potential impacts to Aboriginal heritage items identified the potential for burial sites to be present in the area of the proposed Suffolk Park substation. Due to the uncertainty in knowing where such sites specifically exist a burial management plan is proposed (refer *Chapter 7, Section 7.4*) as a precautionary measure to enable such sites to be managed appropriately if encountered during the proposed works.

In assessing the potential for the Project to impact on contaminated land it was identified that a number of former cattle dip sites may be located in close proximity to the proposed transmission line route and the Ewingsdale substation. The exact location of these dips sites has not yet been confirmed. However, to minimise the risk of these sites being disturbed during construction works a management procedure will be followed (refer *Chapter 12, Section 12.1.4*) to attempt to identify the sites and to provide mitigation measure if encountered (i.e. relocate works).

Other qualitative and quantitative studies undertaken as part of the EA have generally confirmed an identified level of potential impact with a sufficient degree of certainty to enable effective mitigation measures to be prescribed.

The proposal is consistent with the precautionary principle to the extent that all potential threats to the environment have been identified, as outlined in an Environmental Risk Analysis as summarised in *Chapter 17,* and appropriate mitigation measures have been developed to minimise such impacts. All mitigation measure and management procedures form part of the statement of commitments as outlined in *Chapter 18* and will be implemented as part of the project implementation.

The environmental investigations undertaken during the preparation of this EA have identified potential impacts with adequate scientific certainty to justify proceeding with the proposed development. The proposal therefore meets the objectives of precautionary principle of ESD.

16.2 SOCIAL EQUITY INCLUDING INTERGENERATIONAL EQUITY

16.2.1 Interpretation

Social equity involves value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to improve the well-being and welfare of the community, population or society. Social equity does not imply equality but that there should be equal access to opportunities for improved welfare, with a bias towards advantaging the least well-off sectors of society.

Social equity includes intergenerational equity, which requires that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

16.2.2 Justification

The proposal is consistent with the principles of social equity and intergenerational equity through the efficient provision of a service (electricity supply) that provides a number of fair and wide ranging benefits to society.

Safe and reliable electricity supply is essential for the development of a modern economy and community growth and is seen as crucial in most industrialised countries, such as Australia. A continued reliable electricity supply on the NSW Far North Coast will allow the continued operation of business and growth of the economy as well as facilitate the establishment of growth areas as identified in strategic planning policies discussed in *Chapter 4*.

The proposed 25 year life expectancy of this electricity network upgrade detailed in this assessment will ensure that the area is efficiently serviced by electricity in a sustainable manner such that the existing benefits afforded to the community are maintained or enhanced providing both intra and intergenerational equity.

Social and economic benefits to the local community are expected primarily through the capacity for the Far North Coast area to accommodate commercial and residential growth which will in turn provide local employment opportunities, the transfer of technical and commercial skills to local industry, the development of local capacity; and positive multiplier effects in the region.

This EA report has identified and assessed all currently foreseeable impacts of the proposed electricity network upgrade which assists in ensuring that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

In order to achieve the above outcomes Country Energy had undertaken a an extensive amount of community consultation as discussed in *Section 1.8* in *Chapter 1* to assist in the identification potential impacts and opportunities to enhance the proposed development. This has also included consultation with members of the local Aboriginal community to assist in the identification of sites of cultural significance. As a result of the latter Country Energy has identified significant previously unrecorded artefacts and the need to protect same for future generations (refer *Chapter 7*, *Section 7.4*). The historical significance of the Mullumbimby and Lismore Power Stations has also been assessed and will enable appropriate management measures to be incorporated into the proposed substation upgrade works at these locations (refer *Chapter 8*).

The ecological assessment undertaken as part of the EA identified that minimal impacts are expected with respect to biodiversity and ecological integrity from Project. This is primarily due to the line route selection and subsequent use of mostly existing transmission line corridor with minimal to no additional vegetation clearing required. Mitigation measures, including the need for further detailed on the ground assessment have been recommended for those areas proposed to be cleared, or where the final transmission line corridor has not been confirmed.

The detailed assessment and consideration in the EA of the social and ecological elements discussed above, and the appropriate management of these elements during the Project together serve to meet the principles of inter-generational equity.

16.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND MAINTENANCE OF ECOLOGICAL INTEGRITY

16.3.1 Interpretation

Biological diversity refers to the diversity of genes, species, populations, communities and ecosystems, and the linkages between them. Biological resources provide food, medicines, fibres and industrial products. They are also responsible for vital ecological services such as maintaining soil fertility and the supply of clean and fresh water. Maintaining biological diversity safeguards life support functions and can be considered a minimal requirement for intergenerational equity.

16.3.2 Justification

A comprehensive assessment of the likely impacts of the proposal on flora and fauna is detailed in *Chapter 6* and *Appendix H*.

The detailed Ecological Assessment (*Annex H*) concluded that, with the implementation of appropriate mitigation measures (detailed within *Chapter 8* of the Ecological Assessment) the Project will not significantly impact on any threatened species, their habitats or any endangered ecological communities given that 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.

16.4 IMPROVED VALUATION AND PRICING OF ENVIRONMENTAL RESOURCES

16.4.1 Interpretation

This principle is a component of intergenerational equity. The principle relates to the need to determine proper values for services provided by the natural environment, such as the atmosphere's ability to receive gaseous emissions, cultural values and visual amenity.

Applying standard methods of valuation and pricing to environmental resources is a difficult process. This is largely due to the intangible nature of much of the natural environment. The environment has conventionally been considered a free resource, with the true cost to the environment not factored into cost of production or use of that resource.

This principle involves placing a monetary or social value on the environment that ultimately increases its value so as to decrease future exploitation. Pollution and future exploitation can be controlled under the polluter pays principle, whereby polluters who degrade the natural environment are responsible and accountable for returning it to its previous condition.

16.4.2 Justification

This EA examines the environmental consequences of the Project and has identified a number of mitigation measures for potential adverse impacts associated with the proposal and these have been included in the statement of commitments. The mitigation measures have been developed concurrently with the environmental assessment and have been incorporated directly into the electricity network upgrade design. The electricity line route is remaining within the existing easement where possible to reduce environmental and visual impacts and in areas where the line route deviates, it is generally to minimise the social or environmental impacts of the proposal.

Country Energy places great importance on protecting environmental resources that may potentially be affected as a result of its activities and therefore comprehensive mitigation measures are provided within this report to protect the environment and the well being of the community. The cost of these measures can be used as an indirect indication of the value of environmental resources.

In a broader, more strategic sense Country Energy is involved in providing a more sustainable service in three main ways including “countrygreen” energy, renewable energy and environmental initiatives. “countrygreen” allow Country Energy customers to opt for Green Power as part of their Country Energy service. When customers choose this option, Country Energy purchases Green Power on behalf of the customer. Country Energy is also involved in research and development of renewable energy sources such as solar energy, wind farms, hydro power, carbon sequestration, biomass and wave and tidal power. Environmental initiatives that Country Energy is involved in include vegetation management and wildlife protection including fitting poles with special cradles to allow endangered Osprey’s to build nests on top of them and installing bird diverters to make the conductors more conspicuous to birds, especially in migratory and habitat areas.

16.5 CONCLUSION

This EA has assessed the potential environmental impacts associated with the proposed Lismore to Mullumbimby electricity network upgrade. It has been identified that the upgrade of this electricity network is vital to the safe and reliable supply of electricity in the NSW Far North Coast region.

The EA was prepared having regard to biophysical, economic and social considerations and the principles of ESD. There were no significant environmental impacts identified during the preparation of the EA that cannot be mitigated by appropriate mitigation measures and management strategies.

The environmental assessment process has been used to drive the development of the electricity network upgrade design and ensure construction and operation of the network will be sustainable and create minimal disruption to the local community. The majority of the electricity network upgrade works will be undertaken within the existing easement and where deviations are planned, these have generally been proposed to minimise the social and/or environmental impacts of the project.

All mitigation measures and management practices identified in the EA form part of the statement of commitments for the proposal and will be incorporated into the environmental management plans for construction and operation of the electricity network.

Safe and reliable electricity supply is essential to meet a fundamental community need for everyday activities and commercial operations. Country Energy is one of the few large employers based in rural areas therefore providing an important employment role not only for people directly employed by the authority, but also the wider community.

The electricity network upgrade will provide a long-term viable supply of electricity to the Far Northern NSW region. The proposal can be implemented with minimal adverse environmental impacts as demonstrated throughout this assessment and is justified in terms of the overall economic benefits to both the local, state and national economies.