TransGrid URS

# Far North NSW Project

VOLUME 1: MAIN REPORT
AUGUST 2011




# Statement of Validity

## Submission of Environmental Assessment

Prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*

## Environmental Assessment prepared by

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**In respect of**

## Applicant and Land Details

**Applicant**

TransGrid
70-72 Commonwealth St
SURRY HILLS
NSW, 2010

**Subject Site**

TransGrid is proposing to construct a 330kV transmission line approximately 205km long, between the existing Dumaresq Switching Station (near Bonshaw) and Lismore Substation located in Far North New South Wales.

**Project Summary**

The Project comprises:

- a 205km, 330kV easement incorporating pole and tower structures and comprising:
    - construction of a new 96km 330kV transmission line and 60m easement through greenfield areas from Dumaresq Switching Station to the proposed location of the new Tenterfield 330/132kV Substation (Tenterfield 330kV Substation);
    - construction of a new 109km 330kV transmission line between Tenterfield 330kV Substation and Lismore Substation through the existing 132kV easement. Between the Tenterfield 330kV Substation and Casino (95km), the 330kV transmission line would be located on the route of the existing 132kV transmission line. The existing 45m easement would be extended to 60m. Between Casino and Lismore Substation (14km), the new 330kV transmission line would run adjacent to the existing 132kV transmission line (which would remain operational on completion of construction). The existing 45m easement would be extended to 90m for this section.

- removal of 95km of the existing 132kV transmission line between the proposed Tenterfield 330kV Substation and structure 395 to the south of Casino;

- upgrades to the Lismore Substation and Dumaresq Switching Station. Upgrades would be within the existing sub/switching station footprints;
- establishment of a new 330/132kV substation approximately 14km north east of Tenterfield to maintain the existing 132kV connection to the Tenterfield 132kV Substation;
- establishment of access tracks both within the easement and outside the easement for the purposes of transmission line construction and operational maintenance; and
- replacing and restringing the existing earthwire between the new Tenterfield 330kV Substation and existing Tenterfield 132kV Substation with optical ground wire (OPGW).

**Lot and DP** The proposed alignment would pass through in the order of 185 private holdings and a number of road corridors owned by the Crown (refer to **Chapter 3 Location of Works**).

## Environmental Assessment

An Environmental Assessment is attached. The Environmental Assessment assesses the environmental impacts of this project and includes the matters referred to in Director-General's Requirements provided to the Proponent from the 11th September 2009 under Section 75F of the *Environmental Planning and Assessment Act 1979*.

## Declaration

I certify that I have prepared the contents of the Environmental Assessment in accordance with the requirements of the Environmental Planning and Assessment Act 1979 and Regulation and that, to the best of my knowledge, the information contained in this report is not false or misleading.

**Signature:** _____ **Date:** 18 August 2011

**Name:** WILLIAM MILES

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# Notes on Text

### *Note 1*

As a determination of the Project will only be made after the Environmental Assessment has been on public display and submissions considered, the future consolidated tense is used throughout this Environmental Assessment when describing the Project, alternatives and assessing impacts. “Would” is, therefore, used throughout the text in preference to “will”.

If all approvals are given for the Project to proceed, all “would” references should be interpreted as “will”, subject to final conditions of consent.

### *Note 2*

Following the New South Wales State elections on 26 March 2011, a number of State Agencies have changed their names. The Department of Planning (DoP) became the Department of Planning and Infrastructure (DP&I), the Department of Environment Climate Change and Water (DECCW) became the Office of Environment and Heritage (OEH), a division of the NSW Department of Premier and Cabinet (DPC) and Industry and Investment NSW (I&I NSW) became NSW Department of Trade and Investment, Regional Infrastructure and Services (NSW DTIRIS).

Therefore where DoP, DECCW or I&I NSW are mentioned, and where it is appropriate to do so, the reader should note that the new names apply.

# Abbreviations

| | |
|---|---|
| **AADT** | Average Annual Daily Traffic |
| **ABL** | Assessment Background Level. |
| **ABS** | Australian Bureau of Statistics |
| **ACSR** | Aluminium Conductor Steel Reinforced |
| **AECLR** | The aquatic ecological community of the lowland Lachlan River catchment |
| **AER** | Australian Energy Regulator |
| **AHC** | Australian Heritage Commission |
| **AHD** | Australian height datum (in metres) |
| **AHIMS** | Aboriginal Heritage Information Management System |
| **AHIP** | Aboriginal Heritage Impact Permit |
| **AHMP** | Aboriginal Heritage Management Plan |
| **AOS** | Assessments of Significance |
| **AP** | Angle position |
| **APZ** | Asset Protector Zone |
| **ANZEC** | Australian and New Zealand Environment Council |
| **ANZECC** | Australian and New Zealand Environment and Conservation Council |
| **ARC** | Assessment of River Condition |
| **ARCB** | Assessment of River Condition – Aquatic Biota |
| **ARCE** | Assessment of River Condition - Environment |
| **ARG** | Aboriginal Resource Gathering Site |
| **ARPANSA** | The Australian Radiation Protection and Nuclear Safety Agency |
| **AS** | Australian Standard |
| **ASC** | Australia Soil Classification |
| **ASL** | Above sea level |
| **ASRIS** | Australian Soil Resource Information System |
| **ASSMAC** | Acid Sulphate Soil Management Advisory Committee |
| **ASWAT** | Aggregate Stability in Water |
| **ANZECC** | Australian and New Zealand Environment and Conservation Council |
| **AWS** | Automatic Weather Station |
| **BAL** | Bushfire Attack Level |
| **BoM** | Bureau of Meterology |
| **BRG-CMA** | Border Rivers-Gwydir Catchment Management Authority |
| **CDP** | Change Documentation Proforma |
| **CEMP** | Construction Environmental Management Plan |
| **CMAr** | Catchment Management Area |
| **CMA** | Catchment Management Authority |
| **CO** | Carbon monoxide |
| **$CO_2$** | Carbon dioxide |
| **CVA** | Census of Australian Vertebrates |
| **CWD** | Coarse woody debris |
| **DA** | Development Application |
| **DBH** | Diameter at breast height |
| **DEC** | Department of Environment and Conservation (NSW) |
| **DECCW** | Department of Environment, Climate Change and Water (NSW) |
| **DEH** | Department of Environment and Heritage (Commonwealth) |
| **DEWHA** | The Commonwealth Department of the Environment, Water, Heritage and the Arts |
| **DGRs** | Director-General's Requirements |
| **DIPNR** | Department of Infrastructure, Planning and Natural Resources (NSW) |
| **DNR** | Department of Natural Resources |

| | |
|---|---|
| **DoP** | Department of Planning (NSW) |
| **DoPI** | Department of Planning and Infrastructure (formerly DoP) |
| **DP** | Deposited Plan |
| **DPI** | Department of Primary Industries (now known as DII see below) |
| **D-L TL** | Dumaresq – Lismore Transmission Line |
| **DTIRIS** | Department of Trade and Investment, Regional Infrastructure and Services (formerly I&I) |
| **DWE** | Department of Water and Energy |
| **EA** | Environmental Assessment |
| **EC** | Electrical conductivity |
| **ECRTN** | Environmental Criteria for Road Traffic Noise |
| **EEC** | Endangered Ecological Community |
| **EIA** | Environmental Impact Assessment |
| **EIS** | Environmental Impact Statement |
| **EMF** | Electric and Magnetic Field |
| **EMP** | Environmental Management Plan |
| **EMR** | Environmental Management Representative |
| **EMS** | Environmental Management System |
| **ENCM** | Environmental Noise Control Manual |
| **EP&A Act** | NSW Environment Planning and Assessment Act 1979 |
| **EPA** | Environment Protection Authority |
| **EPBC Act** | Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) |
| **EPI** | Environmental Planning Instrument |
| **EPL** | Environment Protection Licence |
| **ERA** | Environmental Risk Assessment |
| **ESC** | Effective Survey Coverage |
| **ESD** | Ecologically Sustainable Development |
| **ESP** | Exchangeable sodium percentage |
| **ETL** | Electricity Transmission Line |
| **EWP** | Elevated work platform |
| **F** | Cleared Farmland/ Cropped Paddock without Paddock Trees |
| **F+T** | Cleared Farmland/ Cropped Paddock with Paddock Trees |
| **FFMP** | Flora and Fauna Management Plan |
| **FM Act** | Fisheries Management Act 1994 |
| **FMP** | Fire Management Plan |
| **FNSW** | Forests NSW |
| **FPC** | Foliage Percent Cover |
| **GHG** | Greenhouse Gas |
| **GIS** | Geographic Information System |
| **GPS** | Global Positioning System |
| **HIL** | Health-Based Soil Investigation Level |
| **ICCG** | Interim Community Consultation Guidelines |
| **ICNG** | Interim Construction Noise Guidelines |
| **ICOMOS** | International Council on Monuments and Sites |
| **IDO** | Interim Development Order |
| **IF** | Isolated Find |
| **IGB** | Inland Grey-Box Woodland |
| **I&I** | Department of Industry and Investment (formerly DPI) |
| **INP** | Industrial Noise Policy |
| **IPCC** | International Panel on Climate Change |
| **KTP** | Key Threatening Process |
| **LALC** | Local Aboriginal Land Council |
| **LEP** | Local Environmental Plan |

| | |
|---|---|
| **LGA** | Local Government Authority |
| **LPMA** | Land and Property Management Authority |
| **MI** | Mugga Ironbark Woodland on hills |
| **MI/CP** | Mugga Ironbark-Box-White Cypress Pine Woodland |
| **MIC** | Maximum Instantaneous Charge |
| **MNES** | Matters of National Environmental Significance |
| **NA** | Not Applicable |
| **NATA** | National Association of Testing Authorities |
| **NEM** | National Electricity Market |
| **NEMMCO** | National Electricity Market Management Company |
| **NEPC** | National Environment Protection Council |
| **NEPM** | National Environment Protection Measure |
| **NER** | National Electricity Rules |
| **NES** | National Environmental Significance |
| **NGRS** | National Greenhouse Response Strategy |
| **NHMRC** | National Health and Medical Research Council |
| **$NO_2$** | Nitrogen Dioxide |
| **NOx** | Oxides of Nitrogen |
| **NOW** | NSW Office of Water |
| **NP** | National Park |
| **NP&W Act** | National Parks and Wildlife Act 1974 (NSW). |
| **NPWS** | National Parks and Wildlife Service (NSW) |
| **NRAtlas** | NSW Natural Resource Atlas |
| **NRBFMC** | Northern Rivers Bush Fire Management Committee |
| **NSW** | New South Wales |
| **NTBFRMC** | Northern Tablelands Bush Fire Risk Management Council |
| **NV Act** | Native Vegetation Act 2003 (NSW) |
| **$O_3$** | Ozone |
| **OCGT** | Open Cycle Gas Turbine |
| **OEH** | Office of Environment and Heritage (formerly DECCW) |
| **OEMP** | Operation Environmental Management Plan |
| **OPGW** | Optical ground wire |
| **OS** | Open Sites |
| **PAD** | Potential archaeological deposit |
| **PBP** | Planning for Bush Fire Protection |
| **PEA** | Preliminary Environmental Assessment |
| **PHA** | Preliminary Hazard Analysis |
| **PM10** | Particles effectively less than 10µm diameter |
| **PM2.5** | Particles effectively less than 2.5µm diameter |
| **POEO Act** | Protection of the Environment Operations Act 1997 (NSW) |
| **POEO Reg** | Protection of the Environment Operations Regulations |
| **RBL** | Rating Background Level |
| **REF** | Review of Environmental Factors |
| **REP** | Regional Environmental Plan |
| **RMS** | Root mean square |
| **RNE** | Register of the National Estate |
| **ROTAP** | Rare or Threatened Australian Plants |
| **RPM** | Revolutions per Minute |
| **RRG** | River Red Gum Riparian Woodland |
| **RS/I** | Red Stringybark and/or Ironbark Open Forest |
| **RTA** | Roads and Traffic Authority (NSW) |
| **SAL** | Sensitive Archaeological Landform |

| | |
|---|---|
| **SD** | Statistical Division |
| **SEPP** | State Environment Planning Policy |
| **SEWPAC** | Department of Sustainability, Environment, Water, Population and Communities |
| **SIC** | Significance Impact Criteria |
| **SIS** | Species Impact Statement |
| **$SO_2$** | Sulphur dioxide |
| **sp.** | Species (singular) |
| **SPL** | Sound Pressure |
| **spp.** | Species (plural) |
| **SS** | Substation |
| **subsp.** | Subspecies |
| **SVC** | Static VAR Compensator |
| **TEC** | Threatened Ecological Community (formerly Endangered Ecological Community) |
| **T-L** | Transmission Line |
| **TSC Act** | Threatened Species Conservation Act 1995 (NSW). |
| **VAC** | Visual Absorption Capacity |
| **VBMP** | Vegetation and Biodiversity Management Plan. |
| **WMS** | Work Method Statement |
| **WSP** | Water Sharing Plan |

**UNITS**

| | |
|---|---|
| **$^o$** | degrees |
| **$^o$C** | degrees Celsius |
| **%** | percentage |
| **bcm** | bank cubic metre |
| **cm** | centimetres |
| **D%** | dispersion percentage |
| **dB** | decibels |
| **dB(A)** | The average level of sound over a set time period. |
| **dB d** | decibel, unit used to express sound intensity |
| **deg** | degrees |
| **g** | gram (= 0.001 kilogram) |
| **GL** | gigalitre ($10^9$ L or $10^6$ $m^3$) |
| **Gt** | gigatonnes (=1 billion tonnes) |
| **GWh** | gigawatt Hour |
| **ha** | hectare |
| **hr** | hour |
| **Hz** | Hertz |
| **kg** | kilogram |
| **kJ** | kilojoules |
| **kL** | kilolitre |
| **km** | kilometre |
| **km/hr** | kilometres per hour |
| **$km^2$** | square kilometre |
| **kPa** | kilopascals |
| **kV** | kilovolts |
| **kVA** | kilovolt – amperes |
| **kW** | kilowatts |
| **L** | litre |
| **L/hr** | litres per hour |
| **L/s** | litres per second |
| **L/t** | litres per tonne |

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| **LA10** | sound level exceeded 10% of the sampling time |
| **LA90** | sound level exceeded 90% of the sampling time |
| **LAeq** | the LAeq is the "equal energy" average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures |
| **LAeq 1 hour** | the "equal energy" average noise level over 60 minutes – used for assessing impacts of noise from motor vehicles |
| **LAeq T** | sound level of continuous noise which emits the same energy as the fluctuation sound over a given time period (T) |
| **LAmax** | the absolute maximum noise level measured in a given time interval |
| **LAN** | the A-weighted sound pressure level exceeded by N% of a given measured period |
| **m** | metre |
| **M** | million |
| **m AHD** | metres above Australian Height Datum |
| **m/s** | metres per second |
| **$m^2$** | square metre |
| **$m^3$** | cubic metre |
| **mG** | milligauss |
| **mg** | milligram |
| **mg/L** | milligrams per litre |
| **MHz** | megahertz |
| **ML** | megalitre |
| **ML/day** | megalitres per day |
| **ML/pa** | megalitres per annum |
| **mm** | millimetre |
| **mm/s** | millimetres per second |
| **Mt** | million tonnes (metric tonne = 1 000kg) |
| **Mtpa** | million tonnes per annum |
| **MVA** | mega Volt-Ampere |
| **MW** | megawatts |
| **pa** | per annum |
| **pH** | degree of acidity or alkalinity of a solution. |
| **ppm** | parts per million |
| **PPV** | Peak Particle Velocity |
| **RBL** | Rating Background Level |
| **s** | second |
| **t** | tonne (= 1 000kg) |
| **tpa** | tonnes per annum |
| **µg/m3** | micrograms ($1 \times 10^{-6}$ grams) per cubic metre |
| **µm** | micrometres (= 0.001mm) |
| **µS/cm** | microsiemens per centimetre |

# Glossary

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| **"A" Frequency Weighting** | The method of comparing an electrical signal with a noise measuring instrument to simulate the way the human ear responds to a range of acoustic frequencies. The symbol to show this parameter has been included in the measurement is "A" (e.g. $L_{Aeq}$). |
| **aboriginal archaeological site (Aboriginal site)** | A place where physical remains or modification of the natural environment indicate past and 'traditional' activities by Aboriginal people. Site types include artefact scatters, isolated artefacts, burials, shell middens, scarred trees, quarries and contact sites. |
| **access tracks** | Refers to establishment of on-easement and off-easement tracks for the purposes of transmission line construction and operational maintenance. |
| **acid sulphate soils (ASS)** | Soils containing pyrite which produces sulphuric acid when exposed to oxygen. Main cause of acid generation within the soil mantle. Commonly found less than five metres above sea level, particularly in low-lying coastal areas such as mangroves, salt marshes, floodplains, swamps, wetlands, estuaries, and brackish or tidal lakes. |
| **air pollutant** | A substance in ambient atmosphere, resulting from the activity of man or from natural processes, causing adverse effects to man and the environment. |
| **alignment** | Refers to the proposed route of the transmission line (also referred to as the centreline) and the associated easement. |
| **alignment east** | Refers to the proposed 60m easement between Tenterfield 330 kV Substation and Lismore Substation (and including Lismore Substation). Between Tenterfield 330kV Substation and Casino, the existing 132kV transmission line would be dismantled and a 330kV line built in its place; and the existing 45m easement would be widened to 60m. Between structure 395 south of Casino and Lismore (14km), the new 330kV line would run adjacent to the existing 132kV line and the easement would be widened to 90m for this section. |
| **alignment west** | Refers to the identified 60m easement and centreline between and including Dumaresq Switching Station and the proposed Tenterfield 330 kV Substation. Within this area there is no existing transmission line. |
| **alluvial deposits** | Soil or sediment deposited by a river or other running water. Typically made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. |
| **ambient noise** | The all-encompassing sound at a site comprising all sources such as industry, traffic, domestic, and natural noises. This is represented as the $L_{eq}$ noise level in environmental noise assessment. (See also $L_{Aeq}$) |
| **amenity** | An agreeable feature, facility or service which makes for a comfortable and pleasant life. |

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| **Angle Position (AP)** | Angle positions represent the locations where the direction of the proposed transmission line changes. The majority of the angle positions will be 'tension supporting structures', i.e. rectangular or square based steel lattice towers. There are a total of approximately 70 Angle Positions proposed for the Project. |
| **Assessment Background Level (ABL)** | The background level representing each assessment period (day, evening and night) which is determined for each 24-hour period of monitoring. |
| **aquifer** | A wet underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt, or clay) from which groundwater can be usefully extracted |
| **archaeology** | The scientific study of human history, particularly the relics and cultural remains of the distant past. |
| **background noise levels** | Background noise is the term used to describe the level of noise measured in the absence of the noise under investigation. It is measured statistically as the A-weighted noise level exceeded for ninety per cent of a sample period. This is represented as the $L_{A90}$ noise level. The measurement sample time may be indicated in the form $L_{A90,t}$ where t is the measurement sample time i.e. $L_{A90,15\ min.}$ |
| **background scatter** | Aboriginal artefacts that cannot be usefully related to a place or focus of past activity. |
| **basin** | A river basin is an extent or an area of land where surface water from rain converges to a single point, usually the exit of the basin, where the waters join another waterbody, such as a river, lake, estuary or ocean. While river catchment and basin can be viewed as different terms for the same thing 'basin' refers to the local catchment area draining into a particular river system, while 'catchment' refers to a wider area. |
| **biobanking scheme** | The Biodiversity Banking and Offset Scheme (Biobanking) has been established by the NSW DECC to help address the loss of biodiversity and threatened species.<br>The framework requires developers to source biodiversity credits through a market mechanism to offset biodiversity loss. |
| **biodiversity** | Biodiversity is defined as encompassing biological variety at genetic, species and ecosystem scales (DASETT 1992). The maintenance of biodiversity, at all levels, is acknowledged internationally as a high conservation priority, and is protected by the International Convention on Biological Diversity 1992. |
| **biodiversity offset** | Biodiversity offset or credit can be created by a landowner by establishing a biobank site committing to enhancing and protecting biodiversity values. The biobank site can be sourced by developers via market mechanism to offset biodiversity loss due to a development. |
| **bioregion** | An ecologically and geographically defined area. They cover relatively large areas of land or water, and contain characteristic, geographically distinct assemblages of natural communities and species distinct from other bioregions. |

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| **blasting** | The controlled use of explosives to excavate or remove rock |
| **Bora Ground site** | Indigenous ceremonial sites |
| **bunding** | An area within a structure designed to prevent breaches or inundation of various types. E.g. chemicals, waste and dangerous goods must be contained within bunding. |
| **catchment area** | The area determined by topographic features within which rainfall will contribute to runoff at a particular point. |
| **catchment disturbance index** | A part of the Australian 'Assessment of River Condition (ARC)' |
| **causeway** | A road or track that is raised above unstable ground e.g. water, sand |
| **channel** | River or irrigation channel, includes bed and bank. |
| **conductors** | Materials which contains moveable electric charge. Electric current can pass continuously along a conductor. |
| **corona effect** | An electrical discharge brought on by the ionization of a fluid surrounding a conductor |
| **crossarm** | A wooden or metal bar located at the top of a utility pole. Power lines are attached to the crossarm via insulators. The crossarm keeps the lines separated by a sufficient distance to prevent arcing. |
| **curtilage** | The enclosed area of land around a building |
| **culvert** | A device (usually a pipe or series of pipes) used to convey water from one side of a barrier to another. Culverts are usually found beneath roads, railways or embankments, helping excess water drain without causing damage and scour erosion to the road. |
| **dB (Decibel)** | A unit of sound level measurement that uses a logarithmic scale. |
| **dewatering** | The process of removing groundwater to lower the water table below the lowest level of excavation. |
| **dispersibility** | A characteristic of soils relating to their structural breakdown in water to individual particles. |
| **drainage line** | A passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain. |
| **earthing strip/stake** | Depending on soil condition will be either galvanized steel, stainless steel or copper straps. All tension and suspension structures will have earthing strips/stakes to 'ground' the structure in the event of a lightning strike. Also known as earthwires. |
| **earthwire** | Tension and suspension structures require earthing fixtures (known variously as earthwires, earthing strips and earthing stakes) to 'ground' the structure and the transmission line in the event of a lightning strike. |
| **easement** | The easement is a 'right of way' along the transmission line route. Easements are required to enable TransGrid to access the line for inspection and maintenance purposes. The easement rights also enable TransGrid to control any activity that may pose a risk to the line or to public safety. |

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| **ecological community** | A combination of plants that are dependant on their environment and influence one another and modify their own environment. They form together, with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region. |
| **Ecologically Sustainable Development (ESD)** | Using, conserving and enhancing the community's natural resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future does not decrease. |
| **ecosystem** | A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) functioning together as a unit. |
| **electromagnetic field** | A physical field of force associated with electric charge in motion, having both electric and magnetic components and containing a definite amount of electromagnetic energy. It affects the behaviour of charged objects in the vicinity of the field. |
| **emission** | A discharge of a substance (e.g. electromagnetic radiation) into the environment. |
| **endangered ecological communities** | A community listed under Schedule 1, Part 3 of the NSW Threatened Species Conservation Act 1995. |
| **endangered species** | Those plants and animal species likely to become extinct unless action is taken to remove or control the factors that threaten their survival. |
| **environment** | The physical, biological, cultural, economic and social characteristics of an area, region or site. |
| **Environmental Assessment (EA)** | The orderly and systematic evaluation of a proposal, including alternatives and objectives, and its effects on the environment, including the mitigation and management of these effects. |
| **environmental constraints** | Limitations on a project by components of the environment. |
| **ephemeral creek** | A creek that only flows after rainfall |
| **erodibility** | The tendency of a soil, earth or rock to erode. |
| **erosion potential** | The susceptibility of a parcel of land to the prevailing agents of erosion. It is dependant on a combination of climate, landform, soil, landuse and land management factors. |
| **existing 132kV easement** | The existing 45m wide easement or 'right of way' between Lismore Substation and Tenterfield 132kV Substation. |
| **feasibility study** | A preliminary technical and economic study to assess the viability of a project from environmental, economic and social perspectives. |
| **footings** | The base or lowest portion of a structure that distributes the overlying weight |
| **grassland** | Land with grass growing on it, especially farmland used for grazing or pasture. |
| **ground vibration** | The level of vibration measured in mm/s. |
| **groundwater** | Water found beneath the earth's surface, in soil, rock, underground streams and/or aquifers |

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| **guy anchor rods** | Steel rods used to hold guy wires or guy anchors in place. The guy anchor is a tensioned cable designed to hold structures in place. |
| **habitat index** | A part of the 'Assessment of River Condition (ARC)' |
| **heritage** | is a broad concept that encompasses Natural, Indigenous and Historic or Cultural inheritance |
| **hydrology** | The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere. |
| **hydrogeology (geohydrology)** | The study of groundwater and the related geologic aspects of surface waters. |
| **hydrological disturbance index** | Assesses the flow regimes change that result from river regulation and/or substantial flow diversion or extraction. |
| **indigenous** | Native to a land or region |
| **infiltration** | The process of surface water soaking into the soil. |
| **intermediate structures** | Structures along which the conductors would be strung. Used principally in locations where the transmission line runs in a straight line. These suspension structures would mainly be twin pole H-frame structures, however wide spans may require 'tension supporting structures' such as steel lattice towers. |
| **invertebrate** | Species that do not have a backbone or spinal column. |
| **isolated find** | Single stone artefact, not located within a rock shelter which occurs without any associated evidence of Aboriginal occupation within a radius of 60 m. |
| **landform** | A specific feature of a landscape (such as a hill) or the general shape of the land. |
| **knapping** | The process of shaping stone to produce tools. |
| **Linear Peak (LIN Peak)** | The maximum level of air pressure fluctuation measured in decibels without frequency weighting (see 'A Frequency Weighting'). |
| **Local Environment Plan (LEP)** | A plan developed by a council to control development in part or all of their shire or municipality. |
| **lithologies** | Rock types. |
| **middens** | Midden deposits can contain a variety of archaeological material, including animal bone, faeces, shell, botanical material, and other artefacts associated with past human occupation. |
| **mitigation measures** | Measure employed to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions). |
| **monitoring** | The checking of impacts of a proposal or an existing activity in order to improve or evaluate environmental management practices. To check the efficiency and effectiveness of the environmental impact assessment process. To determine if the requirements of environmental legislation and associated regulations are being met. |
| **native vegetation** | A broad term for vegetation comprised of plant species which occur naturally in Australia (but which are not necessarily indigenous). |

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| **noxious** | Introduced species considered to be harmful to native species or to the habitat of native species. |
| **nutrient and suspended load index** | A part of the 'Assessment of River Condition (ARC)'. |
| **offset strategy** | A method of offsetting disturbance attributable to the project through additional or compensatory measures. |
| **Operation Environmental Management Plan (OEMP)** | An element of an Environmental Management Plan that addresses the control, training and monitoring measures to be implemented during the operational phase of a project in order to avoid, minimise or ameliorate potentially adverse impacts identified during environmental assessments. |
| **Optical Ground Wire (OPGW)** | A type of cable containing optical fibres. The cable functions in both earthing and communications. |
| **particulate matter** | A small discrete mass of solid or liquid matter that remains individually dispersed in gas or liquid emissions |
| **Peak Particle Velocity (PPV)** | The instantaneous sum of the velocity vectors (measured in millimetres per second) of the ground movement caused by the passage of vibration from blasting. |
| **pedological organisation** | The arrangement of soil peds (soil particles bound together – 'clumps' of soil). A soil with weak pedological organisation will have minimal structure, whilst a soil with strong pedological organisation has strong structure. |
| **perennial** | Refers to a stream which has flow throughout the year. |
| **precautionary principle** | The precautionary principle is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage. |
| **Perception of Sound** | Audible sound ranges from the threshold of hearing at 0dB to the threshold of pain at 130dB and over. A change of 1dB or 2dB in the level of a sound is difficult for most people to detect, whilst a 3-5dB change corresponds to small but noticeable change in perceived loudness. An increase of about 8-10dB is required before the sound subjectively appears to be significantly louder. |
| **preferred corridor** | The corridor identified in September 2009, following initial consultation and environmental studies, within which an alignment would be identified. The corridor width varies between 500m and 1.6km. |
| **quadrat** | A square survey area |
| **Ramsar wetland** | Wetlands that are representative, rare or unique wetlands, or are important for conserving biological diversity |

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| **Rating Background Level (RBL)** | The overall background level representing each assessment period (day (0700-1800)/evening (1800-2200)/night (2200-0700)) over the whole monitoring period (as opposed to over each 24-hour period used for the assessment background level). The rating background level is the level used for assessment purposes. Where the rating background level is found to be less than 30dB(A), then it is set to 30dB(A). |
| **register of the national estate** | A list of the National Estate developed under the provisions of the Commonwealth's Australian Heritage Commission Act 1975. |
| **rehabilitation** | To restore to a condition of good health i.e. rehabilitate land and vegetation. |
| **relief** | The variation in landscape elevation over a region. |
| **revegetation** | Replacement of vegetation, principally grasses and legumes on areas disturbed by construction activities. |
| **riparian** | Relating to, or situated on the bank of a river or other body of water ie riparian vegetation. |
| **risk** | Likelihood of a specific undesirable event occurring within a specified period or in specified circumstances. Listed as a frequency or probability. |
| **risk assessment** | A process used to determine whether people and the environment are at risk (e.g. health and safety) from exposure to hazardous substances used or produced (mainly in an industrial or work place) so that appropriate control measures or management practices can be introduced to prevent or minimise the risk. |
| **scarred tree** | Tree with cuts in its bark or wood made by Aborigines. |
| **scat** | The excrement of an animal. |
| **seedbank** | A seedbank stores seeds as a source for planting in case seed reserves are destroyed (a type of gene bank). |
| **slake** | The process in which earth materials disintegrate and crumble when exposed to moisture |
| **sodic** | A soil in which the ESP is greater than 6. |
| **soil erosion hazard** | The susceptibility of an area of land to erosion and includes rainfall erosivity, slope, soil erodility and cover. |
| **Sound Power Level (SWL)** | Sound power is the energy radiated from a sound source. This power is essentially independent of the surroundings, while the sound pressure depends on the surroundings (e.g. reflecting surfaces) and distance to the receptor. If the sound power is known, the sound pressure at a point can be calculated. Sound power is also measured in logarithmic units, 0 dB sound power level corresponding to 1 pW (10-12 W). The symbol used for sound power level is SWL or Lw, and it is specified in dB. |

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| **Sound Pressure (SPL)** | Sound pressure is the measure of the level or loudness of sound. Like sound power level, it is measured in logarithmic units. The symbol used for sound pressure level is SPL, and it is generally specified in dB. On this scale 0 dB is taken as the threshold of human hearing. |
| **stockpile** | A pile used to store material for future use. |
| **Strahler stream order system** | The system used to define the size of streams. The system has 12 stream orders, with order 1 being the smallest stream size. |
| **structures** | Refers to all of the proposed structures, both angle positions and intermediate structures (see above). Alignment East contains 253 structures and Alignment West 281 structures. However, these figures may change as a result of the detailed design. |
| **study area** | The area in which environmental studies have been undertaken to assist in determining the route, scale and location of the Project components. The study area comprises a western and eastern component as defined below. |
| **study area east** | The area between Tenterfield 330kV Substation and Lismore Substation (and including Lismore Substation) in which environmental studies have been undertaken to assist in determining the route, scale and location of the Project components. This area includes the existing 132kV easement and adjacent areas to allow expansion to a 60m easement (90m from south of Casino to Lismore Substation) and access tracks. |
| **study area west** | The area between and including Dumaresq Switching Station and Tenterfield 330kV Substation in which environmental studies have been undertaken to assist in determining the route, scale and location of the Project components. There is no existing transmission line within this study area. |
| **substation** | A facility for changing or regulating the voltage of electricity. |
| **subsoil** | The layer of soil lying below the topsoil. Usually contains less organic matter and is less fertile than the top soil layer. |
| **surface waters** | All water flowing over, or contained on, a landscape. |
| **suspension structures** | Are designed to carry the weight (vertical load) of the conductors, and any transverse (horizontal) load from wind on the conductors, earthwires, and on the structure itself. Suspension structures are used where the line follows a straight line or has a very small deviation angle, generally less than two degrees. |
| **sustainable use** | Use of organisms, ecosystem services or other renewable resources at a rate within its capacity for renewal. |
| **switching station** | A type of substation where connections are made between several transmission lines. Voltage is not changed. |
| **switchyard** | The enclosed area at a switching station containing the switchgear |

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| **tap-changer** | A transformer tap-changer is a device fitted to a transformer that allows the output voltage of the transformer to be regulated to required levels. It usually involves changing the windings ratio so that a higher or lower voltage can be supplied at the transformer output. |
| **telehandler** | A machine similar to a crane, with a boom that extends both forwards and upwards from the cab. Attachments such as buckets and pallet forks can be fitted to the end of the boom. |
| **tension structures** | Are designed to carry the weight (vertical load) of the conductors, and transverse (horizontal) load from wind on the conductors, longitudinal conductor tension loads, earth wires and the structure itself. Tension structures are required at all changes in direction of the line alignment greater than 2º or where termination sites have been predetermined to facilitate line construction and operation. Tension structures are used when the lighter suspension structures are not suitable. |
| **terrestrial** | Of or pertaining to the land as distinct from the water. |
| **the Project** | The Dumaresq to Lismore 330kV Transmission Line or Far North NSW Project comprising all components, i.e. the 205km 330kV alignment, upgrades at the Lismore Substation and Dumaresq Switching Station, establishment of a new substation north-east of Tenterfield, access tracks to and within the proposed easement and the earthwire replacement works. Also referred to as the proposed Project. |
| **threatened species** | Schedule 1 of the TSC Act lists threatened species as species that are endangered or presumed extinct. |
| **tonality** | Noise containing a prominent frequency and characterised by a definite pitch. |
| **topography** | The relief features or surface configuration of an area. |
| **topsoil** | The upper layer of soil, usually containing more organic material and nutrients than the subsoil beneath it. |
| **transect** | Is a path along which one records and counts occurrences of the phenomenon of a study ie plants. |
| **transient vibration** | The temporary sustained vibration of a mechanical system |
| **transmission line** | Refers to the physical wires (conductors) and the pole and tower structures along the alignment. |
| **understory** | The term for the area of a habitat which grows in the shade of the emergent or forest canopy. |
| **vertebrate** | Species that have a backbone or spinal column. |
| **Visual Absorption Capacity (VAC)** | A classification system used to describe the relative ability of the landscape to accept modifications and alterations without the loss of landscape character or deterioration of visual amenity |
| **visibility** | Measure of extent to which particular components of a development may be visible from surrounding areas. |

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| **vulnerable species** | Schedule 2 of the TSC Act lists vulnerable species and defines a 'vulnerable' species as likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate. |
| **weed** | Naturalised, non-indigenous plant species which may be noxious weeds (or agriculture), environmental weeds or any other generally undesirable introduced species. |
| **whacker rammer** | A vibratory rammer used to compact soil in a confined area |
| **wind climate** | A description of the meteorological conditions created by the wind involving measurements of wind speed, direction and frequency of gusts for average, seasonal and annual conditions. |

# Executive Summary

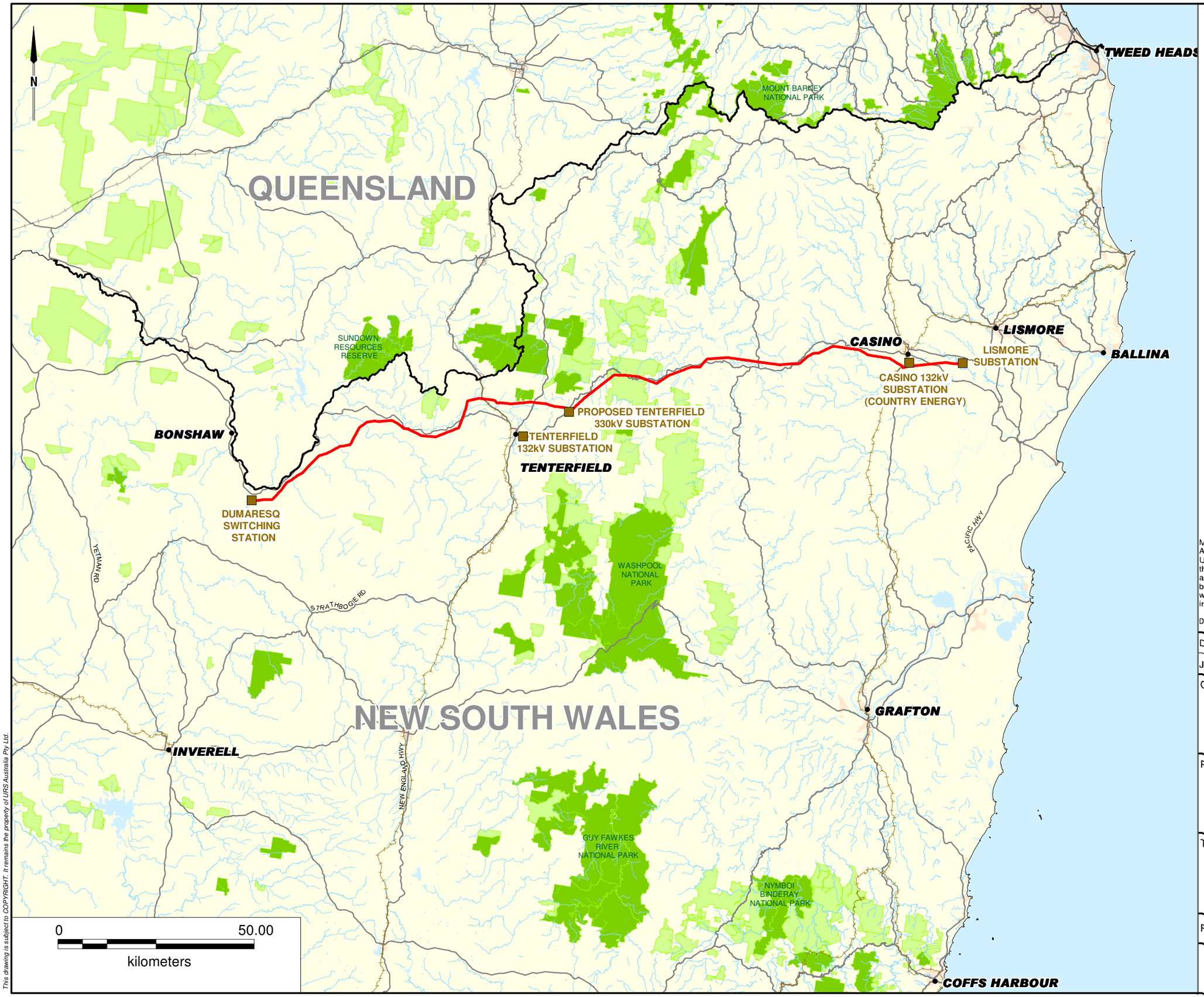
## Introduction and Project Need

TransGrid, a state owned corporation, is proposing to construct a 330kV transmission line in Far North New South Wales (NSW). The proposed line would stretch approximately 205 kilometres (km) between the existing Dumaresq Switching Station (near Bonshaw) and Lismore Substation (**Figure ES-1**). The need for this additional connection has been driven by forecasted growth in peak demand for electricity in Far North NSW.

Notwithstanding demand management measures implemented, current forecasts indicate that overall electricity demand in Far North NSW is predicted to increase in the order of 25% for the 10 years between 2012 and 2021. The upgrades and additions to the existing transmission network that have been undertaken to date have responded to the increasing demand for electricity, and have addressed identified limitations in the network. However, the reliability of supply is expected to be compromised in the future by potential single contingency events which may cause significant interruptions and disturbance to electricity supply. Therefore, to maintain reliability of supply and to meet the increasing demand for electricity across Far North NSW TransGrid plans to invest $227 million in infrastructure to augment the capacity of the electricity network in Far North NSW.

In defining the final route of the proposed Dumaresq to Lismore 330kV transmission line or 'Far North NSW Project' (hereafter referred to as 'the Project'), a Feasibility Study, Constraints Report and a series of route and environmental investigations has been completed.

This work has supported the production of this Environmental Assessment (EA) to meet the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).




Legend

- Proposed 330kV Alignment
- Substation / Switching Station
- Roads
- Railways
- National Parks
- State Forests



Datum: GDA94, Projection: UTM, Grid: MGA Zone 56

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| Drawn: AO/SB | Approved: WM | Date: 09/03/2011 |
| Job No: **43177662** | File: 43177662.104.wor | |

Client

TransGrid

Project

FAR NORTH NSW
(DUMARESQ - LISMORE
330kV TRANSMISSION LINE)
PROJECT

Title

PROJECT LOCATION

Figure: ES-1

URS

## Project Description

The Project comprises:

- construction of a 205km, 330kV transmission line, which includes;
  - a new 96km 330kV transmission line and 60m easement through greenfield areas from Dumaresq Switching Station to the proposed location of the new Tenterfield 330/132kV Substation (Tenterfield 330kV Substation);
  - a new 109km 330kV transmission line between Tenterfield 330kV Substation and Lismore Substation. Between the Tenterfield 330kV Substation and Casino (95km), the 330kV transmission line would replace the existing 132kV transmission line and the existing 45 metre (m) easement would be extended to 60m. Between Casino and Lismore Substation (14km), the new 330kV transmission line would run adjacent to the existing 132kV transmission line (which would remain operational on completion of construction). The existing 45m easement would be extended to 90m for this section;
  - removal of 95km of the existing 132kV transmission line between the proposed Tenterfield 330kV Substation and structure 395 to the south of Casino;
- upgrades to the Lismore Substation and Dumaresq Switching Station (within the existing sub/switching station footprints);
- establishment of a new 330/132kV substation approximately 14km north east of Tenterfield to maintain the existing 132kV connection to the Tenterfield 132kV Substation;
- establishment and upgrade of access tracks both within the easement and outside the easement for the purposes of transmission line construction and operational maintenance;
- replacement and restringing of the existing earthwire between the new Tenterfield 330kV Substation and existing Tenterfield 132kV Substation with optical ground wire (OPGW); and
- construction of a site storage facility with sufficient room for storage of crossarms, insulators, fittings and an area for welding/fabricating and storage of waste materials and other ancillary sites as required.

The structures of the transmission line would be either H-frame concrete poles or steel towers as shown in **Figure ES-2** and **Figure ES-3.**

**Figure ES-2 - H-Frame 330kV Supporting/ Intermediate Structure**

**Figure ES-3 - H Steel Tower 330kV Tension Structure**

The Project is located within five Local Government Areas (Inverell, Tenterfield, Kyogle, Richmond Valley and Lismore) and can be broadly divided into two main sections:

- **Alignment and Access Tracks West**: this section of the alignment would traverse eastward from the existing Dumaresq Switching Station just south of Bonshaw to a point on the existing 132kV alignment, approximately 14km north east of Tenterfield at the proposed Tenterfield 330kV Substation. Within this area, there is no existing transmission line. Alignment west includes the proposed Tenterfield 330kV Substation.
- **Alignment and Access Tracks East:** the proposed alignment runs from the location of the proposed Tenterfield 330kV Substation to the Lismore Substation. The majority of access tracks in alignment east are currently established to provide access to the existing 132kV line. However, some upgrade and/or re-alignment would be required in parts.

It is currently anticipated that construction of the transmission line would commence by mid 2012, subject to being granted Project Approval. Construction of the Project is expected to last for 32 months. Construction work would be completed in four stages, and the capital cost of the Project is $227 million. The operational lifespan of the Project is approximately 30 years.

## Project Alternatives

Alternatives to the Project were considered in terms of new generation, demand management, small scale network augmentations and alternative network options.

The assessment of new generation concluded that there are no viable generation options sufficient to avert the need for the proposed transmission network augmentation.

Alternatives such as demand management programs were also investigated. However, it was determined that they would not defer the need for an augmented supply.

TransGrid's analysis of the alternative options to major investment in augmentation of the network concluded that, although there are potential options, "*there are no known committed or advanced generation or demand management developments that are likely to affect the timing of the onset of the network limitations or the ability of any reasonable option to meet them*."[1] Consequently, transmission network augmentation is seen as the best long-term solution for the Far North Coast's energy needs.

Planning studies by TransGrid and Essential Energy (formerly Country Energy) identified a number of ways to augment the transmission network in Far North NSW. These are discussed in detail in **Chapter 2 Project Need and Alternatives.** It was determined that the alignment for the proposed Project is the most suitable location for this required augmentation. The preferred route for the alignment was chosen following the outcome of the Constraints Identification and Preferred Corridor Report, coupled with on-going discussions with property owners, the community and other key stakeholders. The conclusions of this work identified the preferred alignment as offering the optimum balance between environmental, social and economic impacts when compared to other options. Consequently the Project is the preferred option to augment the capacity of the electricity network in Far North NSW.

[1] pg 24, Final Report – Development of Electricity Supply to the NSW Far North Coast, TransGrid & Country Energy, Mar 2009

# Consultation

Consultation with the community and other key stakeholders regarding the Project commenced in April 2009 and is ongoing. A program of community, landowner and government agency consultation has been undertaken as part of the EA to assist in the identification of relevant issues and potential impacts, whilst also addressing the Director General's Requirements (DGRs) for the Project.

During the Constraints Identification and Preferred Corridor Stage (February – September 2009), following preliminary environmental studies, aerial surveys and feedback from the community, two additional areas were identified for consideration within alignment west. Several key issues were raised as points of concern by local stakeholders. These included environmental issues (such as flora and fauna protection, soil erosion control, dust and noise management and access issues), compensation for land affected by the easement, land use conflicts, visibility of the new infrastructure and the impact this would have on neighbouring properties.

The issues identified during this process, including during the public exhibition of the expanded study areas, fed into the design process and were considered as part of the identification of the preferred corridor and progression of the preferred alignment and associated easement.

A summary of the consultation program is provided in **Appendix D Consultation Report** and includes details of comments received under that program and where/how these issues have been addressed.

During the next phase of the consultation process, the public exhibition, members of the community and stakeholders will have an opportunity to make a formal submission on the Project.

# Assessment of Environmental Impacts

## *Impact Avoidance*

The alignment and associated easement was developed based on the constraints identified and the recommendations contained within the *Constraints Identification and Preferred Corridor Report* (URS, 2009) as well as ongoing environmental surveys, discussions with property owners, community and stakeholders.

Potential environmental impacts related to the Project have been avoided to the greatest degree possible, through the following means:

- A detailed route selection process was undertaken to identify and assess environmental constraints within the study area (*Constraints Identification and Preferred Corridor Report,* URS, 2009). The route selection process identified ecological, heritage, visual and social considerations of sensitive receptors, surface water and ground water, geology, soils and topography. These considerations guided the final location of the Project to avoid impacting on features identified wherever possible.
- The design of the Project has sought to locate the proposed alignment in cleared areas to avoid native vegetation and habitat, particularly to avoid threatened species, populations and ecological communities.
- The alignment has been selected to maximise opportunities to cross drainage lines at right angles to minimise the need for riparian vegetation removal.
- Use of the existing easement within alignment east reduces the potential clearing requirements and associated environmental impact of a new transmission line route through the region.

## Soils, Geology and Topography

There are variable levels of previous disturbance across the landscape associated with the Project. Soil (both topsoil and subsoil) erodibility was identified as an issue in a number of the soil units identified. A number of locations also appear to be relatively undisturbed.

Soils would be disturbed due to construction works associated with the removal of redundant 132kV poles, vegetation clearing, the establishment of access tracks and work sites, erection of new structures and the construction of the proposed Tenterfield 330kV Substation.

Along the existing 132kV transmission line there is potential for the soils to be contaminated with pesticides. Prior to dismantling, a regime of soil sampling would be undertaken to determine the extent of any contamination.

A Soil and Water Management Plan, including an Erosion and Sediment Control Plan, would be implemented as part of the Construction Environmental Management Plan (CEMP) to manage and minimise potential impacts of erosion and sedimentation during construction.

Operational activities along the alignment would be limited to inspections of the line condition and easement, and access track maintenance (including vegetation clearing activities). There is limited potential for significant erosion or soil contamination impacts to occur during operation of the Project.

## Groundwater and Surface Water

The proposed alignment traverses two Catchment Management Areas, the Border Rivers-Gwydir Catchment and the Northern Rivers Catchment Management Area. The main watercourses within the study area include Dumaresq River (near the Dumaresq Switching Station), Clarence River (in the vicinity of Tabulam), Richmond River and Wilsons River (in the vicinity of Casino and Lismore).

The Project may result in impacts to surface water and groundwater. The main potential environmental impacts with regard to surface water are likely to occur where the proposed alignment and access tracks cross watercourses and gullies. Impacts can include bed and bank erosion and pollution from erosion and sedimentation. To minimise this impact, watercourse crossings would be constructed to appropriate standards and all areas disturbed during works would be progressively revegetated or stabilised as soon as practicable.

The Project should not cause a significant disruption to the water table in terms of changes to hydrology and would not have any negative impacts to groundwater quality. Potential impacts to hydrology may occur from any dewatering activities. However, they would be expected to be short in duration and would be highly limited in extent due to the discrete nature of supporting structure footing requirements, the significant spacing between each structure, as well as the overall limited depth of the anticipated intrusion.

## Biodiversity

The Project traverses land that predominantly has been cleared and used for grazing. Despite this, the area supports a range of threatened flora, fauna and ecological communities which may be impacted by the Project.

Two Commonwealth listed and four State listed Threatened Ecological Communities (TECs) were identified within the Project area. The Project has the potential to have a significant impact on all of these TECs.

A full description of the ecological communities considered likely to occur can be found in **Appendix F Biodiversity Report**, with accompanying Significant Impact Criteria (SIC) and Assessments of Significance (AOS) in accordance with NSW State and Commonwealth Legislation. The Project is considered to either potentially or adversely impact 54 threatened fauna species according to the State and Commonwealth assessment outcomes. Of these assessed species, the Project is considered to have a significant impact on five species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). These impacts are detailed in **Section 6.1.5** of **Appendix F Biodiversity Report**.

Mitigation measures have been developed in accordance with best available practices and applicable statutory and policy frameworks. These mitigation measures are proposed to minimise and avoid impacts during construction and operation. Strategies to be implemented would include:

- targeted pre-clearance assessment to be undertaken for specific ecological components;
- two-stage clearing of vegetation in ecologically sensitive areas;
- constrained clearing and maintenance in areas of significant habitat;
- management of edge effects;
- weed management;
- sediment and erosion control;
- management of vegetation corridors identified as having regional connectivity value; and
- management of nesting resources.

These mitigation measures would continue to be developed during the next stages of the Project in line with the conditions of approval. Additionally, consultation will continue with DoP, DECCW and SEWPAC to finalise the details of an offset package to compensate for clearing associated with the Project. This package would be in line with the requirements of the offsetting policies of the aforementioned agencies.

Flora and fauna management plans would be developed which would set out the detailed framework for continuing management, mitigation and monitoring programs. These plans would be part to the CEMP.

## *Indigenous Heritage*

The Project falls within the boundaries of the Casino, Jubullum and Moombahlene Local Aboriginal Land Councils (LALCs). Consultation has been undertaken with Aboriginal stakeholders for the Project, including LALCs in accordance with relevant DECCW guidelines.

During the field surveys, 50 Aboriginal sites were recorded as well as 11 sensitive archaeological landforms (SALs). The SALs are areas where it is considered there is a possibility that a disturbed site or isolated find is present, however poor surface visibility prevents full investigation.

Of the 50 recorded sites:

- twelve are likely to be directly impacted by the proposed works;
- twelve require mitigation measures to ensure their protection;
- thirteen sites are outside Project impacts and do not require mitigation against inadvertent disturbance; and
- thirteen sites are located in the vicinity of access tracks and may be impacted depending on the precise location of the access track.

As a result of the heritage assessment work, changes were made to the easement and structure locations, as well as the access track locations in an attempt to avoid the majority of heritage sites. This has been successful for approximately 80% of the recorded locations (based on 12 known impacts from 61 locations).

TransGrid would endeavour to avoid the sites located in the vicinity of access tracks, where possible. An Aboriginal Heritage Management Plan (AHMP) would be prepared as part of the CEMP to manage and minimise potential impacts during construction.

## *Non-Indigenous Heritage*

Nine historic sites were identified during the course of the surveys. The majority of historic items recorded included ruined farm houses and their related infrastructure. However, all of the recorded sites are either located outside the proposed easement or on the very extremity of the easement and would not be directly impacted by the Project.

The sites recorded are representative of a broad collection of items located across the region and none of the sites recorded displayed features such as uniqueness or intactness.

An appropriate curtilage would be delineated around any identified historic heritage locations to ensure no inadvertent impacts occur.

## *Visual*

The visual assessment undertaken for the proposed Project involved an evaluation of the visual landscape character on and around the Project. It complemented an assessment of potential visual impacts, which may result from the construction and operation of the Project.

The majority of the landscape along the west and east alignments supports rural and semi rural activities, and includes remote areas of timbered forest, small rural townships and larger urban conurbations. The alignment would cross a small number of roads carrying frequent traffic (including the Bruxner Highway).

A total of 147 potential residential receptor locations were identified as a result of the visual assessment. Of these receptors:

- twenty-seven have been determined to have a visibility rating of “nil”;
- one hundred and twelve have been determined to have a “low” visibility rating;
- six have been determined to have a “moderate” visibility rating; and
- two have been determined to have a “high” visibility rating.

Views of the Project structures from all roads are likely to be for a short duration and would be potentially screened by scattered tree cover alongside the road corridor. The construction of the Project would not generally result in any significant visual impacts on the majority of views from road and rail corridors, approaching or passing beneath the transmission line.

The Tenterfield 330kV Substation may be visible from three residences located on high ground to the south of the proposed site (at a distance of around 1.5km to 2km). However, the visibility rating has been determined as low for these residences, as the substation would generally be screened by a combination of undulating landform and tree cover. Similarly views of Project structures from the Bruxner Highway are likely to be for a short duration and would be potentially screened by scattered tree cover alongside the road corridor. A photomontage of the Tenterfield 330kV Substation is shown in **Figure ES-4** (please note this does not show final landscaping design).

**Figure ES-4 Photomontage of the Proposed Tenterfield 330kV Substation**

Works associated with the upgrade of the existing Dumaresq Switching Station and Lismore Substation are unlikely to result in any significant additional visual impact on surrounding receptor locations as all works are within the existing footprints. Equally there are no anticipated significant visual impacts associated with the establishment or maintenance of transmission line access tracks.

## *Traffic and Transportation*

The road network close to the Project is dominated by the Bruxner Highway (State Highway Number 16) and the New England Highway (State Highway Number 9). Traffic flows along these roads are within the roads design capacities.

A cumulative impact assessment of construction traffic associated with the Project was undertaken and illustrates that, in the unlikely event of the outlined 'worst-case' scenario (up to 86 vehicles on site during construction), the performance of the analysed road sections would not significantly change. A detailed Traffic Management Plan would be prepared as part of the CEMP.

Operation phase vehicle movements would be insignificant. Additional road usage would be limited to the western portion of the proposed alignment for maintenance activities and occasionally staff may need to visit the substations/switching station in order to complete routine maintenance.

## *Noise and Vibration*

The noise environment local to the Project is defined by its rural location. Noise monitoring associated with the key Project components generally shows background levels to be low and dominated by intermittent faunal activity. The low background levels of noise mean that the most stringent Rating Background Level (RBL) of 30dB(A) was used to determine the potential impacts of the Project.

Construction impacts were assessed against the *Interim Construction Noise Guidelines* (ICNG). The guidelines note that during standard operating hours, instances where background noise levels are 5dB above the RBL (i.e. 35dB(A)) would result in some community reaction to noise. Where levels exceed 75dB(A) (highly noise affected) as a result of the construction works, a strong community reaction to noise is likely. Specific management controls are recommended in the guidelines depending on the construction noise levels.

The construction noise assessment demonstrates the following:

- when construction activities are in close proximity to each other (such as the clearing of vegetation along the transmission line and the construction of an offsite access track) predicted noise levels at any identified property (receptor) within the study area would be below the highly 'noise-affected' criterion of 75 dB(A); and
- any increases in noise from increased traffic flows would be within the relevant noise criteria.

An appropriate construction noise management strategy would be developed to mitigate and control any noise impacts during construction and would be included as part of the CEMP. Measures to be included within the noise management strategy would be based on, but not limited to, the strategies found within the ICNG.

The construction vibration assessment demonstrates that:

- vibration impacts associated with the use of trucks, bulldozers and rock hammers (for structure foundations) would be significantly less than guidelines that define potential impacts on people and the standards set to prevent structural damage to buildings; and
- construction of the transmission lines would require occasional rock blasting at certain locations and monitoring would be undertaken at receptors within close proximity to any blasting activity to ensure compliance with (Australian and New Zealand Environment and Conservation Council (ANZEEC) guidelines).

The operational noise assessment demonstrates that:

- operational impacts associated with the access tracks and transmission lines would be negligible given the few vehicles that would be required to maintain the Project, and the low noise emissions associated with operational transmission lines;
- the installation of a shunt reactor at Lismore Substation would introduce a new noise source close to a number of identified receptors. A wall around the reactor would reduce the noise contribution by approximately 10dB(A) and would achieve the relevant operational noise limit set by NSW *Industrial Noise Policy*; and
- no operational noise impacts are expected during operation of Tenterfield 330kV Substation and Dumaresq Switching Station.

## *Air Quality*

The Project has the potential to impact on local air quality during the construction works as a result of minor dust generation from the operation of vehicles, access track construction and from exhaust emissions. Given the low number of vehicle movements, the small extent and short duration of the proposed earthworks activities, as well as the distance of the proposed transmission line and the proposed Tenterfield 330kV Substation from potential receptors, it is not considered likely that the Project would have a significant impact on air quality.

The Project would contribute to the release of greenhouse gases into the atmosphere through the operation of mobile plant and transport vehicles, and through selected vegetation removal. The loss of vegetation would diminish the carbon uptake and storage function of the area, and vegetation removal itself would release greenhouse gases into the atmosphere as it decays. A Biodiversity offset package would be finalised to mitigate some of these vegetative losses and is discussed in detail in **Appendix F Biodiversity Report and Chapter 9**.

The Project is estimated to save over 33,000 tonnes of $CO_2$ every year due to increased efficiency of the electricity network. As demand for electricity in the region increases, there would be greater savings in energy as a result of the more efficient transmission lines.

## *Hazard, Risk & Bushfire*

There would be no storage of materials classified as Dangerous Goods associated with the Project. The handling of potentially hazardous materials would be limited to the handling of insulating oil at the substations, and to the application of pesticides and herbicides in appropriate situations following vegetation clearance along the easement. The quantities of these materials would be well below the threshold quantities in State Environmental Planning Policy No. 33 (SEPP 33). The hazard and risk screening has determined that the Project is not "Potentially Hazardous" (as defined in SEPP 33).

The bushfire risk assessment identified the Project would be exposed to varying levels of bushfire risk however they were within acceptable limits. It also concluded the transmission line may increase the risk of bushfire ignition in the region. However, the risk would be reduced to an appropriate level following the implementation of appropriate design measures in higher risk locations. The bushfire protection measures inherent in the proposed design, together with additional Asset Protection Zones, would be consistent with the relevant guidelines.

## *Electric and Magnetic Fields*

An assessment of the potential impact of the Project in relation to electric and magnetic fields (EMFs) was undertaken. TransGrid recognises there is a continuing scientific debate about EMFs and is aware of community concerns regarding the subject.

Under Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) guidance, the risk to human health due to EMF from the Project is considered negligible. Even though no risk to human health has been established, a precautionary approach has been applied to the Project through prudent avoidance.

Prudent avoidance is generally defined as doing what can be done at modest cost and without undue inconvenience to avoid a possible risk. With regard to the Project, it can be demonstrated that TransGrid has undertaken the following steps consistent with prudent avoidance:

- designing the structures (H-frame and lattice tower) with appropriate clearance (height above ground) to ensure EMF levels are below the relevant guidelines;
- siting and selecting the location of the alignment using objectives that included avoidance of residential dwellings, thereby maximising the distance from public exposure; and
- designing the proposed Tenterfield 330kV Substation and the upgrade works at Dumaresq Switching Station and Lismore Substation to ensure EMF levels at the boundaries are below the relevant guidelines.

During operation, EMF exposure levels at all potentially sensitive receptors are below maximum recommended levels. Based on the low levels of field exposure and the findings of the scientific reviews, it can be concluded that the Project is unlikely to cause any significant impacts in relation to power frequency EMFs.

### *Socio-Economic*

An assessment of the potential socio-economic impacts that may arise as a result of the Project has been undertaken. The cost of constructing the Project is estimated at approximately $210 million, with approximately $125 million expected to be spent on capital/materials costs and approximately $85 million spent on labour. It is anticipated the workforce would include local contractors where possible for activities such as earthworks, materials provisions, installation of gates and the upgrade or construction of access tracks.

The Project would generate a positive economic impact within the local region (Richmond Tweed and Northern Statistical Divisions) through the creation of local employment opportunities during the construction phase as well as providing work for local businesses. Construction activity in the area would provide flow-on economic benefits, including increased spending in the local area through demand for accommodation and associated services. Direct spending within the local economy would have a positive impact on local services and businesses. After adjustments for intermediate inputs, the contribution to Gross Regional Product is calculated as $124 million.

The Project would have limited impact on agricultural activities. Grazing and cropping land would not suffer any significant decline in productivity as the proposed easement would not be fenced. The supporting structures would occupy an insignificant amount of the total easement area and the land under the line could be cultivated by mechanical means provided that all activities are in accordance with the easement restrictions which are designed to ensure the safety of the public and the line. There is no evidence suggesting that the line would have any adverse effect on the behaviour or productivity of livestock. Maintenance personnel would need occasional access to the line. However it is not expected that their activities would interfere with normal agricultural activities.

## Draft Statement of Commitments

A Draft Statement of Commitments (**Chapter 19 Draft Statement of Commitments**) has been prepared as required for Part 3A assessments under of the EP&A. This summarises the environmental management measures to be adopted in the detailed design and operation of the proposed Project in order to mitigate adverse impacts on the environment. Construction commitments would be included in a Construction Environmental Management Plan (CEMP), which would be prepared once the Project is approved and prior to commencement of construction activities.

## Project Justification

Justification for the Project includes a range of predicted outcomes. These outcomes respond in the most effective manner to the need for the Project. These include:

- providing a more secure electricity supply for the Far North Coast Region in the short, medium and long term; and
- reducing energy losses across the existing system, thereby saving more than 33,000 tonnes of $CO_2$ every year due to increased efficiency of the network.

The need and objectives of the Project have been addressed in **Chapter 2 Project Need and Alternatives.**

The Residual Risk Analysis demonstrates that the proposed safeguards and management measures are anticipated to reduce the risk, but that significant residual risk remains for some potential impacts. These residual risks have been addressed through the mitigation measures proposed in the respective chapters

within the EA. Provided that the measures suggested within this EA are implemented, it is considered unlikely that the Project would interact with other projects in a way that is likely to cause significant adverse cumulative effects. The detailed residual Risk Analysis is outlined in **Table 20-6** of **Chapter 20 Project Evaluation and Justification**

## Conclusion

The Environmental Assessment for the Project has been undertaken in accordance with the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* and the Environmental Planning and Assessment Regulation 2000.

While TransGrid's high voltage electricity transmission network is currently capable of adequately supplying the Far North Coast (at all times within a ten year planning horizon under normal operations, with all elements of the network in service), upgrades and additions to the network are required to meet predicted demand and ensure the continued reliability of electricity supply in the future. Consequently, there is a need for an augmentation of supply.

Planning studies by TransGrid and Essential Energy identified a number of ways to augment the transmission network in Far North NSW. It was determined the alignment for the proposed Project is the most suitable location for this required augmentation. Studies undertaken show a balance between environment, social and economic constraints is achieved when compared to other identified options, making the proposed alignment the preferred option for the Project.

The EA provides a comprehensive assessment of the Project and includes investigations regarding all relevant environmental issues. Impacts have been assessed and strategies to avoid, minimise and mitigate those impacts form a key part of the EA. Where impacts cannot be avoided, the suite of mitigation measures contained in **Chapter 19 Draft Statement of Commitments** would be implemented during construction and operation, including appropriate offsets where these are required.

The Project has, to the extent feasible, been designed to address the issues of concern to the community and Government. This EA has identified the Project should proceed because it would:

- allow for a reliable provision of electricity to the region;
- provide local employment opportunities and result in positive economic impacts within the locality;
- satisfy sustainable development principles; and
- have a manageable impact on the biophysical environment and on surrounding residents.

On the basis of the identified need, the studies detailed within the Environmental Assessment and the implementation of the recommended mitigation measures, the Project is justified.