COPPERSTRING

Delivering a Powerful Future

Executive Summary

The purpose of the Executive Summary is to convey the principal findings of the environmental impact statement (EIS) prepared for the CopperString Project (the Project) in a concise and readable form.

The objective of the Executive Summary is to engage the reader, encourage them to seek further information in the main body of the EIS and supporting technical reports, and invite them to make a submission on the EIS. The EIS is available as a web-based, interactive document to facilitate ease of access and review at: http://www.copperstring.com.au

The Project

The Project involves the development of a high voltage electricity transmission line to connect electricity users in the North West Minerals Province (NWMP) and the Mount Isa region to the National Electricity Market (NEM) at Woodstock near Townsville. The NWMP is centred on the Mount Isa–Cloncurry region and possesses a significant portion of the world's known lead and zinc resources as well as large resources of silver, copper and gold. It is considered world-class in terms of its base metal production and new mineral projects as province has high potential for new discoveries.

The NEM is the name of the Australian wholesale electricity market and the associated synchronous electricity transmission grid. Over $11 billion of electricity is traded annually in the NEM to meet the demand of almost eight million end-user consumers.

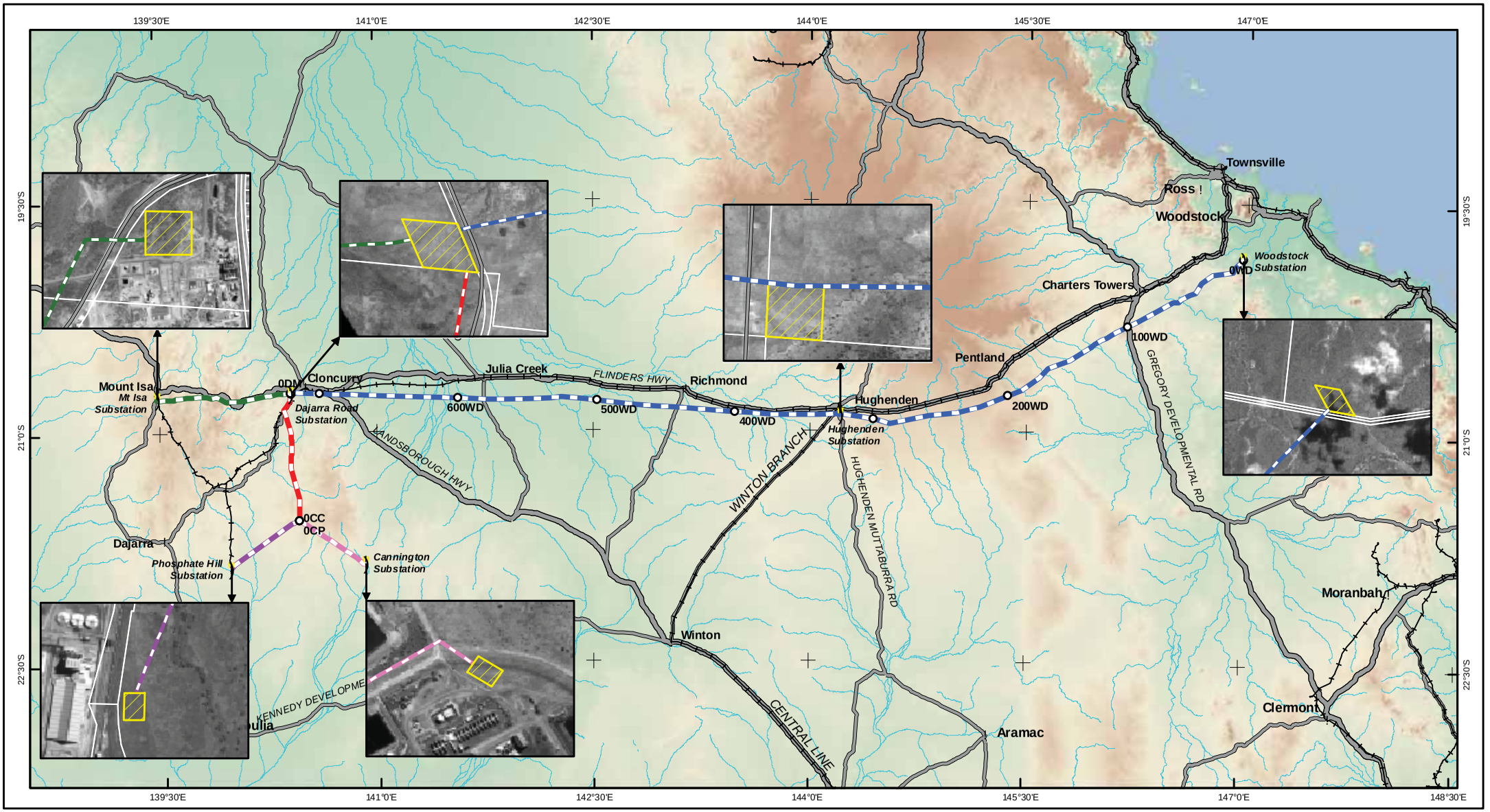
The design of the Project will utilise proven alternating current transmission line engineering to provide between 400-500 MW of transfer capability, greatly enhancing reliability of electricity supply to the NWMP.

The new transmission line (main line) will consist of a 330 kV alternating current double circuit system from a substation near Woodstock, on the recently constructed Ross to Strathmore transmission line, to the Dajarra Road Substation, approximately 10 km South West of Cloncurry. Additional western tangential routes from Dajarra Road will be comprised of 220 kV double and single circuit systems linking potential network users and the Ergon Energy-operated North West Queensland (NWQ) Electricity Supply System to the NEM.

The transmission lines proposed as part of the Project have been broken into sections for ease of description. These sections are summarised below in **Table ES1** and are illustrated in **Figure ES1**.

Table ES1: Transmission line descriptions

Transmission Line Section Description	Distance (km)	Technical Description
Woodstock to Dajarra Road (main line)	719	330 kV Double Circuit Twin Conductor System
Dajarra Road to Mount Isa	98	220 kV Double Circuit Single Conductor System
Dajarra Road to the Common South Point (CSP)	94	220 kV Double Circuit Single Conductor System
CSP to Cannington	57	220 kV Single Circuit Single Conductor System
CSP to Phosphate Hill	60	220 kV Single Circuit Single Conductor System



DATA SOURCE
Base Data: Geoscience Australia, Geodata V3
Imagery: Worldview 2

LEGEND

CopperString Routes
- Woodstock to Dajarra Rd (Main Line)
- Dajarra Rd to Mount Isa
- Dajarra Rd - Common South Point (CSP)
- CSP to Cannington
- CSP to Phosphate Hill

- City / Town
- Kilometre Post
- Proposed Substation
- Railway
- Highway
- Secondary Road
- Major Watercourse

0 30 60 90 120
Kilometers
Datum: GDA94
Projection: MGA94 Zone 54/55

DISCLAIMER
In preparing this map, RLMS have endeavoured to ensure that the data and information are as accurate and reliable as possible. However RLMS cannot accept liability for any decisions or actions of whatever kind or nature based on this study. RLMS expressly disclaims any loss or damage that may arise therefrom.

PROJECT **COPPERSTRING PROJECT EIS**
FIGURE ES1 **PROJECT OVERVIEW**
DATE **NOVEMBER 2010**

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A number of substations will be required as part of the Project in order to interface with new and existing transmission networks. Intermediate substations will be constructed to provide access points for reactive power support, transmission line transpositions and other future network users (e.g. renewable generation opportunities) and regional communities in NWQ. The locations of the new substations for the Project include:

- **Woodstock** – A new substation will be constructed that will interface with the Powerlink-operated 275 kV Strathmore to Ross Transmission Line, South of Townsville. The substation will transform the electricity voltage from 275 kV to 330 kV for transmission across the CopperString transmission network;
- **Hughenden** – A new substation will be constructed on the CopperString main line to provide reactive power support, transmission line transposition and allow future access from potential network users such as renewable energy sources. The substation will be located approximately 5 km South East of Hughenden;
- **Cloncurry (on Cloncurry Dajarra Road – to be called Dajarra Road Substation)** – A new backbone substation will be constructed approximately 10 km south west of Cloncurry. This substation will act as a central hub for transmission lines South to network users, West to Mount Isa and East to the NEM. The substation will also make provision for access from other potential future network users and energy generators. The voltage of the transmission line will be stepped down to the NWQ voltage standard of 220 kV;
- **Mount Isa** – A new substation will be constructed near the existing Mica Creek Substation, South of Mount Isa. This substation would allow the CopperString transmission network to connect to the stand alone NWQ Electricity Supply System and provide an access point for network users; and
- **Mining Substations** – New substations would be constructed at the Cannington (BHP Billiton Pty Ltd) and Phosphate Hill (Incitec Pivot Ltd) mining operations to allow these network users to access the electricity supply from the transmission lines.

The Project will increase the supply and significantly improve the reliability and cost competiveness of electricity for both the general public as well as the major energy users in NWQ. The Project will also provide opportunities for future renewable energy generators located in the corridor between Townsville and Mount Isa to supply electricity to both the NWQ region as well as the NEM.

The Project is expected to have a capital expenditure of approximately $1.5 billion. A three year construction and commissioning schedule from Q4 2011 will result in the transmission network being fully operational from Q4 2014. The Project will have a design life of 40 years, though it is anticipated that this may be extended by regular maintenance and replacement of key components.

The Proponent

CuString Pty Ltd (CuString) and Leighton Contractors Pty Ltd (Leighton Contractors) have formed CopperString Pty Ltd (CopperString), a special purpose vehicle (SPV), to develop the Project. The roles of each entity are summarised in **Table ES2**.

Table ES2: Summary of responsible entities

Logo	Entity	Role
COPPERSTRING	CopperString Pty Ltd	Proponent – Established to develop the Project Network Service Provider
LEIGHTON	Leighton Contractors Pty Ltd	Co-sponsor of the Project Co-financial advisor (in conjunction with KPMG) Sole Designer and construction contractor Sole operations and maintenance contractor Asset manager
CuString	CuString Pty Ltd	Co-sponsor of the Project Provision of services to the Network Service Provider

CuString was established by John G. O'Brien who has been a leader in the electricity supply industry in Queensland for over 20 years and who has worked closely with major stakeholders including mining companies, government and the local community in the development of the Project since 2007. CuString partnered with Leighton Contractors in late 2009 to bring Australia's leading integrated project development, investment, construction and operation/ maintenance expertise into the Project.

Leighton Contractors is an industry leader in the development and delivery of major social and economic infrastructure projects with Government and private sector stakeholders in Australia and New Zealand. The company services clients across a range of industries and sectors including resources, construction, telecommunications, energy, infrastructure and facility management.

Currently CuString and Leighton Contractors have equal holdings in CopperString and the SPV intends to design, construct, commission, operate and maintain the Project. The combination of Leighton Contractors and CuString brings leading infrastructure delivery capability together with a detailed understanding of the electricity supply industry and the economics of energy in northern Queensland.

Project rationale

The NWMP is the dominant source of base metals in Queensland and an extremely prospective, mineral rich area. However, the geographic remoteness of the NWMP region has historically constrained its development as industry has limited access to competitively priced energy and transport infrastructure. The NWMP is currently serviced by an isolated generation system and distributed via a partially unregulated electricity distribution network that is not connected to the NEM.

The Queensland Government is facilitating a process to ensure the delivery of competitively priced and reliable energy to the NWMP through the Northern Economic Triangle Initiative. The *Northern Economic Triangle Infrastructure Plan 2007 – 2012* (NET Infrastructure Plan) provides a pathway to ensure the emergence of Mount Isa, Townsville and Bowen as focal points for mining, minerals processing and industrial development over the next 50 years.

The distribution network in the NWMP is supplied by CS Energy (a Government Owned Corporation) that operates the Mica Creek gas-fired Power Station. The projects that are not connected to the distribution system are serviced by stand-alone gas or diesel fuel power generation units. Many of the commercial arrangements for gas supply and electricity supply in the NWMP are scheduled to finish in 2013/14. Due to a number of issues in the current gas market including uncertainty with future gas availability, delivery and pricing and limited capacity of the existing system without significant upgrades, electricity customers and suppliers may find it difficult to negotiate new long term supply arrangements.

The Queensland Government and Queensland Resources Council jointly commissioned an independent review of options capable of satisfying the long term energy supply requirements of NWQ (Sims, 2009). The Sims Review considered a number of options including:

- Redevelopment of the Mica Creek Power Station;
- Self-supply by large regional customers;
- Electricity transmission links to the NEM; and
- Development of renewable energy generation projects.

The proposed major renewable energy projects along the identified 'clean energy corridor' cannot proceed without a transmission line connecting them to the NEM, due to the relatively small number of potential users of their energy in NWQ. Therefore, there is an opportunity for the major energy users in the NWMP to secure reliable competitive energy, while at the same time promoting development of renewable energy in the NWMP and along the identified clean energy corridor.

The Sims Review concluded that there was insufficient information to determine the lowest cost option for the customers and therefore it recommended that the Queensland Government facilitate a customer driven, competitive process to determine the optimum energy solution. The CopperString Project was developed as a proposal in 2007 around the time of the NET Infrastructure Plan and, since the Sims Review, the major energy users of the NWMP have engaged with CopperString on a commercial basis as the preferred transmission project.

The Project addresses the key priorities and goals of both the Australian and Queensland Governments by:

- Maximising the economic opportunities for mining and processing in the NWMP within acceptable social and environmental standards. Further economic opportunities would be maximised by encouraging development of alternative energy sources, encouraging the development of geographically challenged commercial operations and delivery of more competitively priced, secure and reliable energy, which aligns with the objectives of the *North West*

Regional Plan (DIP, 2010) and the NET Infrastructure Plan (DIP, 2007);

- Directly supporting key *National Infrastructure Priorities* identified by Infrastructure Australia (i.e. progressive extension of the NEM to key development areas, such as the NWMP). The Project will facilitate development of new mines, extend the life of existing mines, increase capacity for local processing of mineral ore and create renewable energy development opportunities; and
- Extending the NEM to a region of high potential for renewable energy generation supports the Renewable Energy Target Scheme. The Renewable Energy Target is the Commonwealth Government's commitment to ensure that 20 percent of Australia's electricity supply will come from renewable sources by 2020.

Community Engagement

The purpose of EIS consultation is to engage community members in informed discussion about what the Project could mean to their community and themselves. This requires providing regular, detailed information about the proposed Project and potential impacts and offering multiple opportunities for community members to participate in consultation.

The CopperString Project Consultation Strategy:

- Utilises existing community focal points and established communication channels along the entire Project impact area to raise awareness and to disseminate Project information, including contact opportunities;
- Proactively engages with high level stakeholders such as councils, agencies and directly impacted landowners and actively seeks their input; and
- Is based on face-to-face contact, with the Project team meeting and discussing issues with stakeholders and communities on home ground.

There are a total of 683 stakeholders registered on the Project stakeholder engagement database; 80 percent comprising residents, business operators, stakeholders and other individuals interested in the Project and 20 percent are property owners. Generally stakeholders are positive and supportive of the Project and the opportunities that the Project will bring to the region.

Consideration is also given to commercial and political interests and their needs are recognised and included in the implementation of the Stakeholder Communications and Engagement Plan.

About the EIS

The objectives of the environmental impact assessment process followed in the preparation of this EIS were:

- To ensure adequate stakeholder participation;
- To meet the requirements of the established EIS process under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) and the terms of reference (TOR) for the Project;
- To provide best available information for decision makers within government;
- To provide a mechanism for risk assessment and management where impacts are uncertain; and
- To facilitate agreement on commitments and conditions of the Project's approval that will be carried through the various stages of the development including construction, operation and decommissioning.

CopperString has engaged a wide range of expert advisors and consultants to ensure the project solution reflects efficient best-practice. Resource and Land Management Services Pty Ltd (RLMS), as the lead EIS consultant and prepared this report on behalf of CopperString. The EIS comprises 16 technical studies that describe the existing conditions and values within the Project area, assesses the potential impacts of the Project on these values and where necessary recommends appropriate mitigation measures to minimise adverse impacts.

A summary of the technical reports is provided in the EIS, in accordance with the requirements of the TOR. A cross-reference table is also provided demonstrating where in the EIS the requirements of the TOR have been addressed.

The EIS is presented in three volumes. These are as follows:

- **Volume 1** – Introduction;
- **Volume 2** – Main Report; and
- **Volume 3** – Appendices (including technical assessment reports).

How to make a submission on the EIS

During the public display of the EIS, the public and Government Agencies are encouraged to review all documents and are invited to make a submission on the EIS. It is important to note that submissions must be made in writing and must be addressed to the Coordinator-General (either electronically or in hard copy). To be considered a properly made submission, the submission must be:

- Received by 5 pm on Monday 7 February 2011;
- Signed by each person who made the submission;
- State the name and address of each person who made the submission; and
- State the grounds of the submission and the facts and circumstances relied on in support of the grounds.

Submissions should be addressed to:

The Coordinator-General
c/- EIS Project Manager: CopperString Project
Significant Projects Coordination
Department of Infrastructure and Planning
PO Box 15009
City East QLD 4002
Australia
T: (07) 3227 8548
E: *copperstring@dip.qld.gov.au*

Submissions are treated as public documents and if confidentiality is required, it must be requested. For further information about how to make a submission on the EIS, visit the Department of Infrastructure and Planning website: www.dip.qld.gov.au/projects/energy/electricity/copperstring-project.html

Legal framework for the Project

On 18 June 2010, the Coordinator-General declared the Project to be a 'significant project for which an EIS is required' under Section 26(1)(a) of the SDPWO Act. This declaration initiates the statutory environmental impact assessment procedure of Part 4 of the SDPWO Act, which requires CopperString to prepare an EIS for the Project.

On 19 August 2010, the Commonwealth Minister for Environment Protection, Water, Heritage and the Arts determined that the Project is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) due to the potential impact on Matters of National Environmental Significance (MNES). The provision under the EPBC Act is:

- Sections 18 and 18(a) (listed threatened species and communities).

As a consequence, the Project requires assessment and approval under the EPBC Act. The Australian Government has accredited the EIS process, to be conducted under the SDPWO Act, under a bilateral agreement between the Australian and Queensland Governments. This will enable the EIS to meet the impact assessment requirements under both Commonwealth and Queensland legislation. The Project will require approval from the responsible Australian Government Minister under Part 9 of the EPBC Act before it can proceed.

The Department of Infrastructure and Planning (DIP) is managing the EIS process on behalf of the Coordinator-General. DIP has invited relevant Australian, State and Local Government representatives and other relevant authorities, to participate in the process as advisory agencies.

The first step in the impact assessment process was the development of the TOR for an EIS for the Project. The process involved the formulation of the draft TOR which were made available for public and advisory agency comment. The Coordinator-General had regard to the 13 submissions received on the draft TOR when finalising the TOR for the Project on 29 Oct 2010.

CopperString has now prepared an EIS to address the TOR, and the Coordinator-General has determined that it is substantially in accordance with the TOR. The EIS is now available for public and advisory agency review. Depending on the outcomes of the review, CopperString may be required to prepare a Supplementary Report to the EIS that addresses specific matters raised in the submissions on the EIS.

The EIS informs the reader how to properly make a submission on the EIS and what form the submissions should take. CopperString has also produced a fact sheet for the public that explain how to make a submission and this information is also available on the CopperString website.

At the completion of the EIS phase, the Coordinator-General will prepare a report evaluating the EIS and other relevant material, pursuant to Section 35 of the SDPWO Act. The Coordinator-General's report will include an assessment and conclusion about the environmental effects of the Project and any associated mitigation measures. Material that will be assessed includes the EIS, properly made submissions and other submissions accepted by the Coordinator-General, and any other material the Coordinator-General considers relevant to the Project such as a supplementary EIS, comments and advice from advisory agencies and other entities, technical reports and legal advice.

The Coordinator-General's report will be publicly notified by placing it on the DIP website. The Coordinator-General's Report will also be presented to CopperString and the Commonwealth Government Minister for Sustainability, Environment, Water, Population and Communities.

Alternative options considered

Applying sustainable development principles, the decision to participate in the State government's competitive process was taken as the Project promotes economic growth and social benefits in the NET and NWMP; facilitates proposed renewable energy projects; and has potential to assist the long-term growth and prosperity of rural towns. Alternatives considered to secure long-term cost effective energy to the NWMP and regional Queensland included conceptual, technological and locality substitutes.

If the Project were not to proceed, the major energy users in the NWMP will still need to secure long term energy contracts. Therefore, any one of the conceptual alternatives discussed below may proceed, including another transmission line proposal.

Conceptual alternatives

The conceptual options for providing competitive and reliable energy to NWQ other than a transmission line connecting to the NEM include:

- Local gas-fired or diesel-fired power generation, which may include self-supply by large regional customers through new or expanded power generation, or more likely, a redevelopment of the existing Mica Creek Power Station; or
- Development of potential renewable energy generation projects.

The Sims Review found that the economics of local generation and transmission are similar, given certain assumptions. While the Sims Review did not make a decision on whether a transmission link to the NEM or a gas based local generation option was preferred, it highlighted the strong risks of unattractive or highly uncertain gas prices for the long term gas supply to Mica Creek Power Station as a disadvantage. It also highlighted that a private transmission line such as the CopperString Project has regulatory and capital cost risks that must be addressed. One of the ways that CopperString is addressing this is by gaining the support of a number of foundation users to underpin the Project's feasibility.

Ergon Energy is a network foundation user of the Project and thus has the ability to connect regional communities to the NEM as it has existing electricity distribution networks in Mount Isa, Cloncurry, Julia Creek and East to the Coast. This supports the vision of the Project and recommendations of the Sims Review to foster the continued economic, social and community growth of the region.

Supply volumes and prices of gas are currently uncertain in Queensland due to the emergence of the liquefied natural gas projects. Supply of gas to NWQ is likely to involve the continued development of new gas fields (primarily coal seam gas fields) in order to deliver sufficient volumes of gas. In addition, the nature of small to medium mining projects means that the energy solution is more likely to be onsite diesel fired generation which is relatively expensive and would require ongoing diesel deliveries.

Three proposed renewable energy projects were presented at the North Queensland renewable energy roundtable forum in November 2009 (BIS Shrapnel, 2010), including the:

- Windlab Systems Pty Ltd's proposal for a 600 MW wind farm at Hughenden (Kennedy Wind Farm);
- Australian PhytoFuel Company Pty Ltd's proposal for producing biodiesel feedstock and using the waste biomass to generate power around Hughenden/Julia Creek; and
- Samsung's presentation of a solar/biomass project at Pentland.

The location of these projects is too far from the existing NEM to make connection economically feasible. Therefore, development of renewable energy projects, as a standalone solution to the energy needs of NWQ, is not feasible.

These projects together provide potential for up to 900 MW of installed renewable energy capacity to be connected to the NEM. The CopperString Project has the potential to make these renewable energy projects economically feasible by facilitating connection to the NEM and NWMP.

Technological alternatives

Proven AC overhead power transmission technology has been chosen for the Project. Technological alternatives to this type of transmission include:

- *High voltage direct current transmission* – The high voltage direct current (HVDC) transmission line uses direct current for transmission as opposed to AC systems. The AC system was determined to be advantageous and better suited for a number of reasons, including the additional expense to connect loads or generators to the system along its route.
- *Underground transmission* – Underground transmission cables are up to four times more expensive than overhead transmission lines. They require large trenches, need to follow strict safety guidelines, be clearly and regularly marked and are difficult to lay in rocky ground conditions. The voltage control of underground systems is also more difficult due to large charging currents in underground cables.

Locality alternatives – route selection

The objective of the Project is to connect the major energy users of the NWMP to the NEM. A NEM connection point near Townsville was chosen as it is in a direct line to the East of Mount Isa and Cloncurry and is thus a shorter route to the NEM than other options under consideration. A connection around the same latitude as Townsville also has the added benefit of being closer to the clean energy corridor of potential projects including solar, wind, biofuels and geothermal technologies.

A preliminary route selection study was undertaken in 2007/2008 at the inception of the Project, for the purposes of an initial feasibility study. As the Project developed, a more detailed route selection study was completed to identify a corridor alignment for a 275/330 kV AC transmission line from the North-South 275 kV Ross to Strathmore transmission line located South of Townsville to a substation located near to Cloncurry. Additional routes for 220 kV transmission lines to potential foundation users were also investigated.

The *CopperString Route Selection Report* is provided as an appendix to the EIS and gives an overview of the reasoning for the broad route selection from the number of preliminary options identified.

Construction of the Project

The CopperString construction solution takes into account the linear nature of the Project, its remote location restrictions and the prevalent weather patterns applicable to the region. The construction of the Project is scheduled to take approximately 36 months to complete and be supplemented by a four month early works period for the procurement of materials and construction camp establishment.

It is estimated that the total construction workforce for the Project will be approximately 750. Due to the linear nature of the infrastructure, the workforce and associated camps will be spread across a number of construction zones, as shown in **Table ES3**, with workforce personnel progressing to different construction zones during the Project's construction schedule.

Where possible the construction camps have been located near major towns of the region, as preferred by the local councils, to make best use of existing services, including water supply, electricity and sewage services. The construction of the Project is planned to occur in 11 different construction zones, each having a central construction camp with the exception of the zones that are serviced from existing local accommodation.

Table ES3 : Construction zones and associated accommodation description

Construction Zone	Construction of transmission route (km)	Location of Construction Zone	Accommodation Description	Planned Workforce Number
1	40	Woodstock	Existing Permanent Accommodation at Townsville	150
2	92	Charters Towers	Construction Camp at Charters Towers	150
3	124	Pentland	Construction Camp at Pentland	150
4	128	Hughenden	Construction Camp at Hughenden	150
5	128	Richmond	Construction Camp at Richmond	150
6	140	Julia Creek	Construction Camp at Julia Creek	150
7	148	Cloncurry	Construction Camp at Cloncurry	300
8	100	Mt Isa	Existing Permanent Accommodation at Mount Isa	150
9	142	Six-Mile Plain	Construction Camp near Six-Mile Plain	150
10	57	Cannington		
11	60	Phosphate Hill		

Figure ES2 demonstrates the construction staging that CopperString plans to employ for the Project. The construction will be undertaken using three simultaneous work fronts for the transmission line construction, moving from one construction zone to another upon completion of the required works. Each work front will construct approximately 360 km of transmission line construction over the extent of the Project, in a number of construction zones.

The construction staging schedule has been developed with reference to the seasonal rainfall anticipated during the summer months. Potential high risk areas will be targeted for construction during the dry months.

Each work front will consist of a number of smaller teams conducting all activities necessary to construct the transmission and substation infrastructure. For example, once the clearing and access teams of a particular work front have completed a construction zone, they will move onto the next construction zone, while other teams, such as piling and foundation teams continue their activities. This accounts for the overlap of activities occurring within individual construction zones.

While this is a major infrastructure project, the construction methodology is not technically complex and the sequence of tasks is repetitive for both the transmission line and substation construction process. As the construction tasks are not technologically complex, material supply, logistics and resource availability are the key drivers of the construction solution.

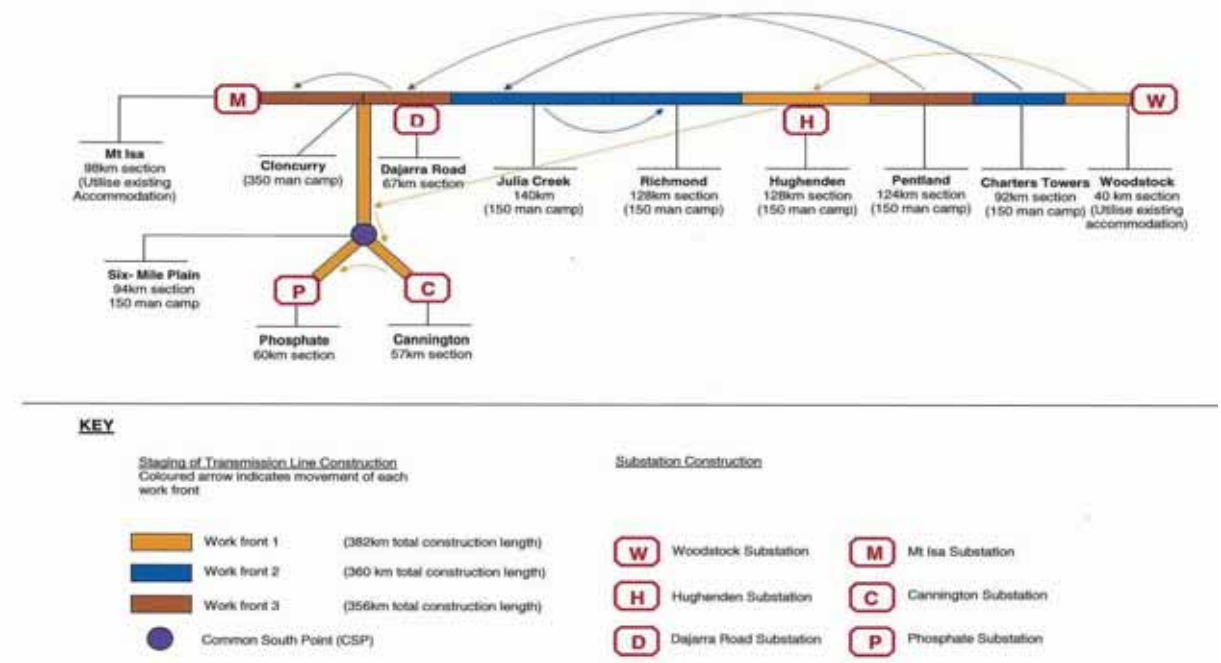

Figure ES2 : Construction zone staging

Commissioning and operation

The transmission network will be subject to a detailed testing and commissioning plan and a number of performance trials to verify the integrity of the transmission line and substation infrastructure. The substation equipment will first be tested at the equipment and functional level, followed by a complete substation testing regime. The transmission lines will undergo final inspection, testing and all temporary earths will be removed prior to the energisation of the line.

The commissioning process is anticipated to take two months from the finalisation of construction and the individual component testing at substation sites is likely to begin before the finalisation of construction on the complete network. No additional infrastructure will be required for the commissioning of the Project and minimal environmental or social impacts are associated with this process.

Ongoing maintenance will be required throughout the operation of the transmission network, though the scale and intensity will be dramatically less than the construction period. The operational period of the Project will require 15 full-time equivalent (FTE) employees to operate the transmission network plus an additional 15 part-time maintenance employees as required.

Broadly the operation and maintenance of the Project will necessitate:

- Maintenance – field based routine and defect maintenance, asset management systems and associated supportive staff;
- Network control (operations) – continuous operation of a control centre capable of monitoring the network and dispatching field teams for routine and defect maintenance;
- Life cycle replacement requirements; and
- Administrative management of the system.

Decommissioning and rehabilitation

The design life of the transmission network is expected to be 40 years. The life of the Project may be increased with effective maintenance and replacement of key components. The ultimate decommissioning of the Project would require the removal of the transmission network infrastructure in accordance with the relevant standards and legislation applicable at that time. These requirements are anticipated to be no less stringent than current standards.

The decommissioning process would essentially necessitate the reverse of the construction process, where, following electrical isolation the conductors and earth wires would be lowered, wound onto drums and transported for recycling.

Towers would be dismantled and the steel structures would also be transported and the scrap metal recycled. Concrete foundations would be cut off below ground level and the rubble removed.

Decommissioning activities will also be addressed with regard to the same impacts as the construction phase. If no further transmission lines were planned for the easement, then the easement would be surrendered and returned in an acceptable condition with regard to the existing land use in the area.

Environment – values, impacts and management strategies

The Project is anticipated to generate a number of impacts to the natural, social and economic environment, both negative and positive. The more significant impacts and mitigation measures which have been incorporated into the Project's Environmental Management Plans (EMPs) are detailed below.

Climate and natural hazards

On the basis of meteorological conditions and understanding of the Project area, it was possible to identify three distinct climatic zones.

The coastal zone is typified by summers that are generally hot, wet and humid with regular afternoon sea breezes. Winter months are dominated by South East trade winds and mostly fine weather with cool nights. On average, the coastal zone receives approximately 1000 mm of rainfall with most falling in summer months.

Westward from the coastal lowlands the alignment rises and crosses the Great Dividing Range. This area is very similar to the coastal lowlands although the elevation results in reduced temperature and higher relative humidity averages.

The inland zone is typified by mild/hot climatic conditions and low humidity for most of the year (May to December), reaching 40 degrees in summer. The wet season usually brings 75 percent of the annual rainfall; however annual rainfall can vary significantly, with less than 250 mm in one year and greater than 500 mm the following year.

In the tropical climate, the seasons are defined by hot, humid and wet monsoonal summers and dry winters with cool nights. The design, construction and management of the Project must respond to climatic conditions inherent to the region as well as the risk of extreme climatic events, natural or induced hazards. The coastal zone is likely to be affected by more intense storm and tropical cyclone events, i.e. strong wind gusts and heavy rainfall, which may lead to localised flooding, storm surge or infrastructure damage.

Inland, high evaporation or a failure of the wet season may cause severe strain on the available surface water supplies and lead to fires, dust and general land degradation. Subsequent summer rains lead to soil erosion and in severe events localised or widespread flooding. All of these climatic conditions will be considered in the design, construction scheduling and ongoing maintenance of the Project.

Potential climate change impacts on construction and operation of the Project would likely result in a hotter, drier landscape that has less rainfall events in winter and spring, but the storm events that do occur are likely to be more intense and possibly destructive.

Given the predicted decline in rainfall and increased evaporation, soil moisture and availability and quality of water is predicted to be affected. Likewise, the impacts of dust and risk of bushfire will be emphasised, though these impacts are likely to occur well into the future after the conclusion of the construction schedule. The design of the transmission network will incorporate the potential for climate change and increased climate variability.

The Project alignment traverses approximately 35 major waterways in the Flinders River, Coopers Creek, Leichhardt River, Georgina River and Burdekin River. Where available, Council flood data, studies and gauging station data was used to assess flood behaviour along the Project easement with particular reference to substation sites and proposed camps sites. A qualitative assessment of the potential impacts of the proposed transmission line upon flooding was undertaken with the following conclusions:

- Transmission lines and towers will cross a number of waterways and will likely have minimal flood impacts, however siting this infrastructure awill occur as far as practical outside the floodplain; and
- Critical infrastructure (i.e. substations and construction camps) will also likely have minimal flood impacts, but more importantly will require an appropriate level of flood immunity and local drainage design.

Quantitative and qualitative assessments indicate that the proposed camps and the substations would appear to be located outside the typical floodplain extents and hence are likely to have an appropriate level of flood protection. However, confirmation of flood modelling or ground levels would be required to confirm if an appropriate level of flood immunity is achieved.

Scenic amenity

There is a diverse mosaic of landscapes which comprise the Project corridor, though six key landscape character areas have been identified for the purposes of the environmental assessment. These areas relate to the landscape's ability to visually absorb the transmission line, and are based primarily on topography and vegetative cover. The landscape areas are:

- Woodstock to the Burra Range;
- Hughenden to Richmond and surrounds;
- Julia Creek and surrounds;
- Cloncurry and surrounds;
- Dajarra Road to Mount Isa; and
- Dajarra Road to Cannington and Phosphate Hill.

The visual impact assessment of the transmission line was based on the identification of the level of visual modification created by the Project and the sensitivity of the viewer. These two characteristics are then considered when assigning a level of likely visual impact. A range of visual impacts have been identified within the study area and include impacts during both the construction and operation of the Project during daylight and night time hours. They can be summarised in terms of views from publicly accessible roads; views from the railway; views from public open space and designated viewpoints.

The initial route selection process is considered the most effective mechanism in avoiding visual impacts of sensitive viewpoints. The proposed alignment minimises visual impact to large population centres by avoiding close proximity to these sensitive locations. Due to the scale of the Project and size of the transmission towers some level of visual impact is unavoidable and few mitigation techniques are available to limit the overall impact. However, some specific mitigation measures will be implemented at key viewpoints to minimise visual impact to key tourist routes and public open spaces. The mitigation measures include consideration of the placement of towers at critical locations and vegetative screening to substations and maintenance areas.

Geology and soils

In terms of the topography, soils, geology, geomorphology and landforms of the Project area it is evident that three separate landscape areas exist, from East to West. These are the:

- Einasleigh Uplands – The area is dominated by resistant basement rocks, comprising granite and a mix of volcanic rocks including tuff and 'welded' air-fall pyroclastic types as well as lavas. The geology represents (geologically) relatively recent volcanic activity;
- Carpentaria Plains – The area is part of the Carpentaria and Karumba Basins and extends to the Great Dividing Range. The flat landscape comprises river-borne and wind-blown (alluvial and aeolian) soils that overlie a near horizontal sequence of relatively young sandstone, muddy sandstone and limestone rock types; and
- Isa Highlands - An area of relatively low steep-sided ridges and hills comprising resistant igneous rock types interspersed (intruded) within metamorphosed (predominantly sandstone and mudstone) sediments. The area is characterised by sharp ridges, elongated plateaux and steep-sided tors, separated by narrow river valleys and broad, alluvial clay plains.

Identified constraints to the Project include the sourcing of the rock and materials required for the construction of the Project, the siting of towers to minimise potential future erosion and the proximity of construction activities to waterways in the Project area.

The potential for the Project's activities to have environmental impacts on the topography, geology, geomorphology and soils of the Project area primarily stems from the construction phase of the Project. Impacts potentially include:

- Increased dust;
- Compaction in areas of soft soil (particularly in the Carpentaria Plains);
- Increased erosion;
- Potential lateral erosion near rivers if the alignments run parallel to a river, particularly along outer banks of meander rivers;
- Potential disturbance of fossils (particularly in the eastern section of Carpentaria Plains within limestone deposits); and
- Compaction and erosion along access tracks/easements.

Management measures for the mitigation of environmental impacts on geology, landforms and soil caused by the Project include the implementation of erosion and sediment control plans, which involve effective monitoring and maintenance programs. Other measures comprise the effective design of the Project to avoid impacts (e.g. tower siting and avoiding lateral erosion from positioning the transmission line parallel to waterways).

Specific management measures will be implemented for identified areas of constraint, including waterway crossings and steep slopes where consideration will be given to tower placement and erosion reduction measures. For work sites identified to occur in highly erodible soils measures will include erosion matting and sediment socks.

Overall the Project is interpreted to have a negligible impact on the geology and low physical impact on the landform (geomorphological processes) or soils where appropriate mitigation measures are implemented.

Land contamination

A desktop review has been undertaken to determine any possible properties within the alignment that have the potential to contain contamination sources. Further assessment of potential contamination occurred through interviews with landholders and site inspections carried out as part of other field studies. Twenty-eight land parcels were found to be listed on the Queensland Environmental Management Register, due to the occurrence of Notifiable Activities predominantly relating to livestock dips/spray race operations and potential contamination from mine wastes.

One property intersected by the Project was found to have a 'substantial' potential for unexploded ordnance (UXO). This categorisation refers to land that has a history of numerous UXO without specific search or remediation. The identified site of substantial potential is approximately 5 km from the proposed alignment. Eight properties have been identified to have a 'slight' potential for UXO. These are centred around the South East of Charters Towers and likely to be due to the Macrossan Stores Depot, which is the major northern bulk stores depot for the Australian Defence Force materials.

The land parcels identified are considered to require further investigation to determine the presence, type and extent of any contamination that may be nearby and the risk that it may pose. The potential for the Project to cause further contamination to the land or water of the Project area is considered minor given the appropriate controls proposed.

These controls include the application of design and construction standards and specific management plans and procedures to prevent contamination occurring and all handling, storage and management of hazardous materials utilised as part of the Project's construction and operation will comply with the relevant Australian Standards and the Material Safety Data Sheet (MSDS) requirements for each product.

Existing land use and tenure

The predominant land use in the Project area is production from relatively natural environments (e.g. livestock grazing); totalling approximately 94 percent of the alignment The transmission network will directly impact on 139 land parcels, not including land zoned for drainage or roads. Of these parcels, low intensity cattle production is the dominant activity. These agricultural pursuits are typical of large rural operations of the region and are reflected in the large land parcel sizes. The only other significant land use is conservation and natural environments (approximately 6 percent).

North Queensland (with specific reference to the Mount Isa, Cloncurry and Charters Towers regions) is well known for its economic and historic exploitation of mineral reserves. The study area is rich in lead, zinc and copper (predominantly surrounding Mount Isa), copper and gold (Cloncurry) and gold (Charters Towers). While the alignment does not pass through any existing mining operations, it does traverse areas covered by exhausted resources/sites of previous mineral exploration and mineral exploration permit areas.

Most of the Project will be constructed on private properties. In order to gain this access and right of use, the Project will be constructed on easements to accommodate the transmission network infrastructure. The easement will give CopperString the right to construct and operate the transmission infrastructure while the landholder will maintain most existing uses of the land. CopperString will negotiate with landholders to secure a right of way for the 120 m wide easement for any potential transmission line duplication. The transmission line for the main line will only utilise one half of the easement (i.e. 60 m). After the conclusion of construction activities and site rehabilitation the physical land occupied by towers will be approximately 0.2-0.4 percent of the total easement area.

The easement required for the transmission line infrastructure from Woodstock to Dajarra Road is 120 m in width, with the additional western tangential sections requiring an easement of 60 m in width. The substations will be built on land at each site acquired for the Project and typically the substation infrastructure will only require between 10-30 percent of the acquired land, with the rest being utilised for construction laydown areas and as an operational buffer to the surrounding environment. The end-user mining substations will be located on the Mining Lease of the respective mining operations and will not require land acquisition.

The Project is consistent with the strategic directions of the *North West Regional Plan* (DIP, 2010) in promoting a dynamic robust and diversified economy and providing infrastructure and services, while creating a more sustainable future.

Nature conservation

The main line will result in the clearing of 4545 ha of mapped remnant vegetation and the clearing of an additional 1629 ha of remnant vegetation is anticipated as a result of the western tangential lines, which are not currently covered by certified regional ecosystem mapping. This, in conjunction with edge effects associated with clearing, which may include weed invasion and decrease in vegetation integrity, provide the largest impact to vegetation potentially imposed by the Project.

The only listed threatened community recorded from database searches and field surveys is the 'semi-evergreen Vine Thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions' which is listed as an Endangered Community under the EPBC Act.

At one point the easement is in close proximity to the Rishton Scrub which contains this threatened community. It has been identified that there will be a minor unmitigated impact on this community during the clearing, construction and operational phases of the Project. There is a moderate unmitigated impact identified during the operational phase, mainly due to secondary impacts from edge effects and potential increases to existing fire regimes. There will be a negligible residual impact on this community provided that the proposed activities are appropriately buffered (i.e. 200m) during all phases of the Project. Where this is not possible, the community will be identified as a 'no go zone' during construction and the proposed mitigation strategies will be implemented.

Impact assessment indicates that, without mitigation, during the clearing, construction and decommissioning phases, there is potential for moderate impacts on 12 mapped regional ecosystems and 19 significant flora species. During the operational and maintenance phases, there is the potential for moderate impacts to seven mapped regional ecosystems and seven significant flora species. In avoiding these vegetation communities and/or habitats where practicable and/or implementing the recommended mitigation strategies through an EMP for the Project, all residual impacts are reduced to minor or negligible.

The results of impact assessment indicate that, without mitigation, 32 fauna species are likely to suffer moderate or significant impacts from the proposed works. The nature of the majority of these species is that they are restricted in distribution and/or habitat preference and the proposed easement contains habitat the species are known to occur in. The majority of impacts on fauna are considered to be during the clearing and construction phases of the Project. The Project will implement appropriate measures to mitigate impacts on important habitat for conservation significant species throughout the life of the Project.

Implementation of a weed management plan during both construction and operation of the Project will reduce potential impacts from weeds on biodiversity values to minor or negligible.

The construction of creek crossings for access tracks (which can affect riparian and aquatic habitats, and fish movement) poses the greatest threat to aquatic ecology. While each crossing will affect a localised area of aquatic habitat, there is the potential for widespread impact on a linear scale, given the length of the proposed transmission line routes. However, the significance of this impact can be substantially reduced if the proposed mitigation measures are followed.

When proposed mitigation measures are followed and construction in wetlands is avoided, no impacts to conservationally significant habitats or species are expected, and the potential impacts of fuel handling and stormwater runoff on the creeks along the proposed transmission line routes (and downstream waterways) can be minimised to an acceptable level.

Surface water resources and water quality

The Project traverses several large catchment areas in central and northern Queensland, with a number of large river systems draining these catchment areas. These major river systems and associated catchments include the Burdekin River, Flinders River, Cooper Creek, Leichardt River and the Georgina River.

An analysis of stream flow data for the major waterways in the area indicates that the majority of waterways within the Project area are ephemeral in nature, with flow regimes displaying a distinct seasonal pattern. High flows are experienced in these waterways during the wet season (November to April), while during the dry season (May to October) there is little to no flow.

A number of significant surface water storages were identified within the general Project area. These include the Burdekin Falls Dam, Burdekin Weir, Chinaman Creek Dam, Lake Corella, Lake Mary Kathleen, Lake Julius, Lake Moondarra, and Rifle Creek Dam. While in most cases these are some distance from the Project and are not likely to be impacted by the proposed Project, Chinaman Creek Dam is in close proximity to a proposed substation site (5 km to the East) and is used by Cloncurry as its town water supply.

Existing surface town water supplies are proposed to be utilised for the temporary construction camps and associated construction activities in Charters Towers and Cloncurry.

The foremost potential impacts to surface water are ground disturbance leading to sediment run-off, accidental spills of chemicals and damage to riparian vegetation. The potential impacts to surface water resources will be minimal for all phases of the Project, provided that the recommended mitigation measures are implemented, including the implementation of a water quality monitoring program where construction works may potentially impact on environmentally sensitive locations.

Groundwater resources

The proposed alignment traverses the Great Artesian Basin (GAB), one of the largest artesian groundwater basins in the world. Groundwater from the GAB provides the only source of reliable water along most of the alignment, and as such is of vital importance to both human users and the environment. Groundwater sources are proposed to be utilised within the following construction zones:

- Pentland;
- Hughenden;
- Richmond;
- Julia Creek; and
- Six-Mile Plain.

Investigations have identified that the key issues pertaining to groundwater are likely to occur during the construction phase through the use of groundwater resources for construction activities and camp utilisation. Assessment of existing town water supplies has indicated that the use of town water is expected to have minimal impacts to existing groundwater resources. The exception to this includes the proposed construction camps at Pentland and Six-Mile Plain, where other existing bores or new bores may be required.

Investigation of potential impacts to groundwater has indicated that the Project is likely to have minimal impacts on existing users and environmental values of groundwater, providing the recommended mitigation measures are undertaken. Where new or existing bores are proposed to access water, the following management measures will be undertaken to ensure impacts of use are minimised:

- A pump test and drawdown investigation will be undertaken to ensure adequate yields would be available for camp use and also that adequate yields would be maintained for surrounding users;
- Ongoing monitoring of surrounding bore levels will be undertaken to ensure yields are maintained and an appropriate management plan should yields decrease to ensure compensation is provided;
- Water quality testing will be undertaken to determine the treatment requirements required for use to comply with the *Australian Drinking Water Guidelines* (NHMRC, 2004); and
- A licenced water bore driller will be used for any new bores.

Air quality

Potential air quality impacts from the construction of the Project are predicted to be low and manageable. Construction activities of the transmission line and associated substation and temporary supporting infrastructure (e.g. concrete batching plants) are expected to have the greatest potential for impacting values of the air environment. CopperString will develop and implement an EMP to manage air quality emissions from construction activities and consider buffer distances when siting concrete batching plants, or utilise existing plants where practicable.

Operational emissions will be minor releases related to vegetation management and driving on unpaved roads. Any impacts will be minor and insignificant due to the infrequent nature of operational emissions and the short duration of individual operational emission events.

Decommissioning activities may result in similar emission profiles to construction, although these will be significantly reduced due to the absence of concrete batching (which is a major potential source of particulates), the lack of piling for foundations and limited vegetation clearing. There are not expected to be any substantial air quality impacts from decommissioning activities.

Greenhouse gas

Greenhouse gas emissions may occur onsite as a result of the decomposition of cleared vegetation. This represents the single largest Scope 1 (direct) emission source from the Project. Annual average Scope 1 greenhouse gas emissions from the Project are estimated to be 0.0095 percent of the national electricity supply sector.

Consumption of purchased electricity as a result of transmission line losses across the network is clearly the single largest source of greenhouse gas emissions over the Project life. Although an indirect (Scope 2) emission source, it makes up more than 90 percent of greenhouse gas emissions from the development. Scope 2 emissions are likely to reduce over time as the emissions intensity of the electricity generation in Queensland changes (e.g. from an increase in gas fuelled generation, the introduction of renewable energy and efforts to improve the efficiency of power generation).

Considered in context with the alternative energy solutions for NWQ, the Project provides a scale-efficient energy supply solution to both the large-energy users in the NWMP and regional communities. This would reduce the Scope 1 and 2 emissions from projects connecting into the CopperString transmission network. In addition, providing economical access to the NEM will support future development of new mines and mine expansions in the NWMP, growth of renewable energy generation and the attainment of renewable energy targets.

Noise and vibration

The assessment of potential noise impacts of the proposed construction and operations of the Project was undertaken on the surrounding noise sensitive receptor locations. Throughout the assessment, 'worst-case' construction and operations conditions have been considered, assuming for each construction and operations stage that all plant equipment is continuously and simultaneously working.

The assessment found that in its operational phase, the transmission line and associated infrastructure would comply with the established noise limit criteria at all identified receptor locations without the requirement for any specific noise mitigation measures. Compliance with the identified daytime construction noise limit would be expected at all receptors located approximately 1 km or further away from the work fronts. Whilst some exceedence of the noise criteria limits may occur at some closer receptor locations, due to the linear nature of the Project the effects will be transient and considered to be relatively minor.

The predicted increase in off-site road traffic volume due to the proposed construction is significant. While compliance with the relevant road traffic noise criteria is predicted, an increase in noise levels may be perceived by the most affected receptors during the construction phase. It is concluded that noise impacts from construction activities and operation of the proposed transmission line are not expected to significantly degrade the existing acoustic environment nor create undue annoyance to the closest receptors.

A number of good practice construction and operations noise control measures are adopted to minimise noise emissions from the Project easement. The predicted noise levels will be verified periodically during the Project's development, through effective monitoring programs and landholder feedback/complaint registers.

Waste

Wastes produced by the Project will be of a general nature and typical of a construction project. The majority of waste will be produced during the construction phase and very little waste will be generated during operation and maintenance activities. All waste will be disposed of at licensed waste receival or recycling facilities, and no waste treatment or disposal infrastructure will be constructed as part of the Project.

It is anticipated that much of the waste generated as a result of the works can be beneficially reused within the Project and where wastes cannot be reused, recycling opportunities will be maximised. The management of waste streams is similar across construction projects and it is not anticipated that the production of waste as a result of the construction, operation and decommissioning of the Project will pose a risk to the health of workers, public or the environment.

Transport

The Project's construction requires delivery of definitive volumes of construction materials across an expansive distance of approximately 1200 km, to a number of geographically dispersed sites over approximately three years. In addition the individual construction camps will act as isolated Project nodes that will serve to limit any cumulative transport activity.

For these reasons the Project does not concentrate an intensity of transport activity to any singular location(s) in the region. The increase in traffic associated with the construction and operation of the Project would not impact on road capacity, safety or the general amenity of the local community to a point where further controls or assessments are required. Once operational, the Project will generate very low volumes of transport activity mainly being for support and maintenance functions.

The major arterial roads running through the Project region are the Flinders and Barkly Highways (East – West) and Bruce Highway (North – South) that are under the management of the Department of Transport and Main Roads. Construction associated with the Project will involve transportation of both raw construction materials and individual over dimensional components to site and associated personnel movements. The majority of raw construction material deliveries will come from Townsville via Charters Towers and will access the construction alignment from the East via the Flinders Highway.

The Project will use State controlled roads as well as local government roads and access to private roads/tracks for delivery of construction materials, substation equipment and for worker access. Calculations indicate that the average daily rate of traffic at any point in the Project's road network during the construction phase would likely be in the order of 6.95 vehicles per day. All the major roads within the proposed transport routes have sufficient capacity to accommodate the increased volumes.

As the majority of the area in the vicinity of the proposed construction sites is sparsely populated with a relatively small number of potential road users, potential impacts are considered manageable with the implementation of mitigation measures. The adoption of safeguards for minimising traffic impacts, through the implementation of a Transport Management Plan, should reduce community disruption and the risk of traffic accidents to an acceptable level, while minimising structural and environmental damage.

Non-Indigenous cultural heritage

A desktop assessment of relevant heritage lists and a field survey of the alignment have indicated that sites of non-indigenous cultural heritage value do not exist within the transmission line easement. As a result, no places of non-indigenous cultural heritage significance will be permanently impacted upon by the Project.

Despite this, the identification of heritage listed sites in close proximity to the alignment has been noted due to the potential for these sites to be negatively impacted upon by Project construction activities. The identification of archaeological zones within the corridor is also significant to note, due to the potential for artefacts to be uncovered during construction and the need to implement necessary cultural heritage management plans (CHMPs), in the event of artefact discovery.

The assessment has identified, described and evaluated the heritage values of non-Indigenous cultural sites located within and in close proximity to the route alignment; the potential impacts that may occur to these sites due to the Project; and has suggested potential management and mitigation measures to ensure that these places are not inadvertently disturbed or destroyed during construction of the transmission line.

Indigenous cultural heritage

The assessment of Indigenous cultural heritage for the Project and the proposed management strategy has been designed to avoid and/or minimise any impacts to Indigenous cultural heritage. The assessment has included collating site data throughout the study area from a range of sources including the Aboriginal Heritage Register and Database, published and unpublished sources.

CopperString has undertaken to notify Aboriginal parties in accordance with Part 7 of the *Aboriginal Cultural Heritage Act 2003* to develop statutory CHMPs and has commenced talks with the relevant Aboriginal parties to agree to the terms and conditions of the CHMP. CopperString is committed to continued engagement and negotiations with endorsed Aboriginal Parties and to developing and implementing approved CHMPs.

One site registered on the Aboriginal Cultural Heritage Register may be impacted by the Project. A field survey will be undertaken to relocate the site. There are expected to be potential impacts on some Indigenous cultural heritage material that is yet to be identified within the Project area. In instances where this cannot be avoided, measures to mitigate impacts will be agreed with the relevant Aboriginal parties, in accordance with the approved CHMPs.

Social environment

The Social Impact Assessment (SIA) consultation process relied on information provided during the Project community engagement processes and specific SIA consultations. The SIA consultations included three self-selected landholder case studies and discussions with local councils and other organisations (including Indigenous service providers) to verify desktop based information and findings and provide input into the identification of potential social impacts and opportunities.

Impacts to quality of the living environment, health and wellbeing, economic and material wellbeing, cultural and community values, and community services and facilities were identified as potential impacts to the social values of the affected landholders and the wider regional community.

During the construction phase of the Project, the greatest social impacts to landholders reported through the three case studies were regarding quality of the living environment, health and wellbeing and disturbance to normal property management. These were all rated as medium impacts after application of proposed mitigation measures. During the operation and maintenance phase, feedback from stakeholders identified the increased risk of aerial fatality during property management activities such as heli-mustering. This is given a high rating, even after implementation of proposed mitigation measures due to the extreme consequences perceived by the landholders. Specific management measures have been proposed to inform the community of the potential risk to aerial activities created by the Project and lessen landholders concerns and risks.

Drafting of a number of management plans, strategies and policies has commenced to address potential social impacts and opportunities, including:

- Modifications to Project design;
- Project and construction camp policies including provision of dedicated construction accommodation for predominantly fly in/fly out workforce, fatigue management, occupational health and safety, induction program, Code of Conduct, camp medical services and community participation and sponsorship;
- Negotiation of landholder compensation packages;
- Development and implementation of a Stakeholder Communications and Engagement Plan;
- Development and implementation of a Local Participation Plan and Training and Education Program; and
- Development and implementation of an enquiries/complaints handling protocol and dispute resolution process.

Other strategies being prepared and implemented to address environmental impacts, such as the EMPs, CHMPs, a Transport Management Plan, and Emergency Management Plan will also contribute to minimising some aspects of social impacts.

A monitoring program has been developed in order to provide information on whether the potential social impacts and opportunities actually occur or not and the effectiveness of the associated management plans. Results of the monitoring program will be reported monthly or every six months during construction and every three years during operations and maintenance.

Economic environment

NWQ contains some of the most valuable mineral resources in Australia. The western part of the region, particularly around Mount Isa and Cloncurry, is the home of many mines and mineral processing plants. Current energy prices in NWQ are high by national and international standards and the prices are higher than energy prices that are available in the NEM.

The estimated capital cost of the Project is $1.5 billion; of this around $300 million will be spent on imported components. Capital expenditure is expected to commence in 2011, peaking in 2013. Annual operations and maintenance costs will vary over the years, but are expected to average around $9 million per annum.

Overall, the impacts of the Project for the Queensland and Australian economies, compared to a reference case where an additional large scale electricity supply option did not proceed, would be significant as follows:

- Real income, which is a key proxy for economic welfare, is expected to increase nationally by $6.5 billion (in Net Present Value terms); and
- An estimated one off average per person increase in real income for every current Australian of approximately $295 (in Net Present Value terms). Queenslanders would receive a higher than average benefit, while the rest of Australia would receive a lower than average benefit, albeit still positive.

The Project would be likely to increase employment in Queensland by around 5200 employee years over the period 2011 to 2030 (or around 260 additional FTE jobs per year).

Total additional government revenues throughout Australia are projected to increase by $5.6 billion as a result of the Project (with a discounted value of $2.8 billion using a 4 percent discount rate). The Australian Government will be a major beneficiary through higher collections of company tax and personal income tax. Around 30 percent of the revenues that are generated from the company taxes will be payable by the proponents of the Project.

Sustainability

Sustainability outcomes may be assessed through consideration of the Project's effects on environmental, social and economic values at the local, regional and national scale. The Project supports achievement of sustainability objectives through providing a net positive economic benefit and local regional and national levels as well as consequential improvements which may accrue by enabling increased access to the mineral resources in the NWMP.

The Project will have a socially positive outcome by providing employment opportunities, as well as the provision of stable energy to remote townships and locations. A net positive environmental benefit is expected from the Project through the minimisation of impacts during the construction period, low operational impacts, and the facilitation of connection and access of otherwise constrained renewable projects to the NEM.

Overall the Project will have an ongoing benefit in the long term improvement of environmental, social, and economic values in excess of short term effects on any individual sector.

Hazard and risk

A hazard and risk assessment of the Project has been undertaken to identify the potential hazards and risks to people and property due to atypical/abnormal events associated with the construction and operation of the Project. The potential hazards associated with the Project are considered to be common to similar transmission network projects worldwide. The hazard and risk assessment process applied to this study is closely aligned with the risk management principles outlined in *ISO 31000:2009 – Risk Management, Principles and Guidelines*.

A high-level identification and evaluation of the relevant hazards and risks associated with the Project was conducted through a Preliminary Hazard Analysis (PHA). This allows potentially significant risk exposures to be efficiently identified and prioritised for further, more detailed analysis.

In total there were 34 risks identified, which were rated sufficiently highly to be carried forward for further, more detailed analysis (including several that were consolidated into similar categories).

The risk analysis determined that the risk levels with respect to the proposed control and mitigation strategies were considered acceptable, based upon the following factors:

- Risks are similar to those that are currently considered tolerable by the community;
- The Project will be designed, constructed and operated under the comprehensive regulatory environment which exists for the electricity transmission industry in Australia, much of which addresses the well-understood inherent safety risks and system reliability considerations;
- The proposed design makes use of operational technology and construction methods which are proven and standard for the industry;
- The environmental setting of the Project is favourable, with extensive separation achieved between the Project and potential receptors and sensitive land uses, which minimises the risk exposure from localised hazard events, such as transformer fires or explosions; and
- The more regional risk associated with bushfire is similarly mitigated through the available separation, but additional features such as the low to moderate inherent bushfire risk and planned vegetation management process further reduce the risk.

A lower inherent risk is anticipated than those experienced by numerous existing electricity transmission and distribution assets elsewhere in Queensland and Australia, which often co-exist in close proximity to both more densely populated and vegetated areas. When this understanding of the inherent hazard is coupled with commitments to implementing Australian industry standard risk management practices, the overall risk profile with respect to people and property would be favourable in the broader electricity transmission industry context.

Aerial activities have been identified as a potential hazard through consultation with individual landholders and the Department of Community Safety. Specific aerial activities that may be impacted by the operation of the Project include:

- Aerial stock mustering;
- Use of landing areas associated with rural homesteads and other facilities;
- Aircraft conducting power line surveys for CopperString and other electricity entities; and
- Impact on Civil Aviation Safety Authority (CASA) registered or certificated aerodromes.

Transmission line safety has been a priority in the planning and design of the Project and CopperString commits to undertaking further consultation with landholders regarding the safety of aerial work operations. The prevention of aircraft contact with the transmission infrastructure will incorporate a number of mitigation measures including; ongoing landholder consultation on the location of the transmission lines, utilisation of transmission line identification markers in areas of aircraft use and ensuring CopperString personnel conducting aerial activities are accredited to do so and operate in accordance with Environment and Safe Work Method Statements and fatigue management plans under the Operational Safety Management System

An assessment of the potential for Electric and Magnetic Fields (EMF) to impact on human health was conducted with reference to a review of current scientific literature and current international best practice standards. Calculations of anticipated EMF levels for both the substation and transmission line infrastructure are in accordance with relevant Australian and international guidelines.

CopperString recognises that EMF is an issue of great importance to local communities and nearby residents. CopperString as part of the Stakeholder and Community Engagement Plan will endeavour to:

- Remain up to date with the latest scientific research into possible linkages between EMF and adverse health impacts;
- Liaise closely with the community to ensure they are educated and informed of emerging research and EMF policy development; and
- Encourage concerned stakeholders to liaise with independent organisations in relation to EMF and transmission infrastructure (i.e. Australian Radiation Protection and Nuclear Safety Agency).

Cumulative impacts

The EIS presents an overview of other Projects known to occur within the vicinity of the proposed transmission netork and an assessment has been conducted of the likelihood of these other projects interacting with the CopperString Project.

Through the assessment process, predominant overlaps were reduced to a number of mining projects likely to proceed around Cloncurry in the NWMP. These projects include the:

- Expansion of the Cannington Mine;
- Dugald River Base Metal Project;
- Rocklands Copper Project;
- Mount Margaret Copper Project; and
- Roseby Copper Project.

Mitigation measures specific to managing cumulative effects are proposed, though it is expected that most improvements will occur as a result of implementing the mitigation measures proposed in other sections of the EIS.

Matters of National Environmental Significance

A stand-alone section on potential impacts to Matters of National Environmental Significance (MNES) has been prepared and included in the EIS. Desktop studies and targeted field investigations were undertaken to assess the likely presence of threatened species and communities in the study area including the following:

- Flora:
  - Black Iron box (*Eucalyptus raveretiana*) – listed vulnerable
  - Pink Gidgee (*Acacia crombiei*) – listed vulnerable
  - White Mountain's Wattle*(Acacia ramiflora)* – listed vulnerable
  - Shrubby Bush Pear *(Marsdenia brevifolia)* – listed vulnerable

  - *Tylophora williamsii* – listed vulnerable
  - *Austrobryonia argillicola* – listed endangered
  - Waxy Cabbage Palm (*Livistona lanuginosa*) – listed vulnerable
  - Mount Stuart Ironbark (*Eucalyptus paedoglauca*) – listed vulnerable
  - Frogbit (*Hydrocharis dubia*) – listed vulnerable
- Birds:
  - Black-throated Finch (*Poephila cinta cinta*) – listed endangered
  - Squatter Pigeon (*Geophaps scripta scripta*) – listed vulnerable
  - Night Parrot (*Pezoporus occidentalis*) – listed endangered
  - Star Finch (Eastern) (*Neochmia ruficauda ruficauda*) – listed endangered
  - Gouldian Finch (*Erythrura gouldiae*) – listed endangered
  - Red Goshawk (*Erythrotriorchis radiates*) – listed vulnerable
  - Australian Painted Snipe (*Rostratula australis*) – listed vulnerable
- Mammals:
  - Julia Creek Dunnart (*Sminthopsis douglasi*) – listed endangered
  - Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) – listed vulnerable
- Reptiles:
  - Yakka Skink (*Egernia rugosa*) – listed vulnerable
  - Gulf Snapping Turtle (*Elseya lavarackorum*) – listed endangered
  - Side-striped Fine-lined Slider (*Lerista vittata*) – listed vulnerable
  - Ornamental Snake (*Denisonia maculate*) – listed vulnerable
- Fish:
  - Redfin Blue Eye (*Scaturiginichthys vermeilipinnis*) – listed endangered
  - Edgbaston Goby (*Chlamydogobius squamigenus*) – listed vulnerable
  - Murray Cod (*Maccullochella peelii peelii*) – listed vulnerable
  - Freshwater Sawfish (*Pristis microdon*) – listed vulnerable
- Ecological communities:
  - Brigalow (*Acacia harpophylla* dominant and co-dominant) – listed endangered
  - Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions – listed endangered.

The distribution and likely occurrence within the Project easement of the above listed species has been described, together with an assessment of potential impacts on each, proposed mitigation measures to minimise impacts, and an assessment of the residual impacts.

EPBC Act listed species detected during the targeted field surveys include:

- Waxy Cabbage Palm: A palm endemic to the Burdekin River catchment and restricted to the riparian channels of the Cape and Campaspe Rivers and major tributaries. Important populations occur within the alignment corridor along the Campaspe River;
- Black Iron Box: A central Queensland endemic tree occupying riparian river and creek banks which are often subject to degradation by invasive weeds such as rubber vine. Populations are known along the Burdekin River in proximity to the proposed alignment crossing; and
- Squatter Pigeon: Observed at various locations along the proposed Woodstock to Dajarra Road alignment.

Black Iron Box and Waxy Cabbage Palm have both been confirmed to occur within the Project easement. Additional site-specific searches and species location mapping will be conducted for these species in suitable habitat proposed to be disturbed, prior to clearing/construction. Specific measures of avoidance, buffering, and monitoring for long-term

health will be implemented through the EMP for the Project. If disturbance to a known population of these species is unavoidable, consultation with Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) will be undertaken, a management plan will be developed and if offsets are necessary they will be made by agreement with the SEWPaC.

Mitigation measures that will be adopted by the CopperString Project to minimise overall impacts on MNES include:

- Targeted field surveys in suitable habitat within 200 m of any proposed disturbance prior to construction activities commencing;
- Identification and mapping of all individuals/populations and establishing protective buffers;
- Developing a threatened species management plan if required;
- Avoiding disturbance to any individuals/populations by route adjustment, selective placement of towers away from immediate riparian zones, retention and buffering of riparian vegetation, and retention of individuals and riparian vegetation under the transmission lines;
- Reduced clearing including considering existing habitat condition, condition and management of riparian zones, and management intent/regimes of landholders including stock management;
- Implementing short- and long-term weed control;
- Installing bird diverters in strategic locations;
- Helicopter stringing of conductors in the vicinity of environmentally sensitive areas such as riparian corridors;
- Implementing standard dust suppression measures;
- Removing and relocating fauna;
- Implementing erosion and sedimentation controls;
- Managing ongoing fire hazards;
- Considering translocation of individuals and habitat offsetting; and
- Monitoring of habitat and species over the long-term.

Environmental management

CopperString is committed to operating in a manner which conforms to the contractual requirements of its customers and to all relevant regulatory and legislative requirements. To achieve this objective, CopperString will plan, implement and control systems which facilitate the management of the environmental aspects of its activities.

The construction and operational EMPs provide specific environmental management requirements to ensure that works undertaken for the construction and operation of the Project have minimal adverse effects on the environment and surrounding community. They have been prepared to address the environmental management strategies including performance criteria, management actions and monitoring, auditing and reporting requirements and to specify areas of responsibility related to the Project.

The environmental management strategies contained in the EMPs are based on the potential environmental impacts highlighted in the EIS, the Project construction and operations and maintenance program and any legislative requirements, including Project approval and permit conditions, which will be sought at the conclusion of the EIS process.

Conclusions

The long-term economic and social development of the NWMP is heavily dependent on the availability of competitively priced and reliable electricity supply through a system that is expandable to meet future demand at a low marginal cost. This requirement has been recognised by the Queensland Government in a number of policy statements and strategies and through the provision of practical support.

The Federal Government identified the extension of the NEM to the NWMP as a national infrastructure priority in 2009, and has been an active stakeholder in the Sims Review process.

The CopperString Project is a private sector initiative that will deliver significant community benefits within the local, regional and National contexts. Based on the recommendations of the Sims Review, the Project will upgrade the electricity supply to the NWMP to foster the continued economic, social and community growth of the region.

The development of the Project would support the following:

- Access to competitively priced energy would further diminish the risk of energy price instability from a single primary energy source;
- An electricity connection path for future renewable energy projects within the identified clean energy corridor;
- Increased resource exploration in NWQ by providing competitive and reliable energy supply for the exploration and processing of products;
- Access to the NEM by small mining operations that will decrease reliance on diesel power generation; and
- Decreased risk of supply interruptions to industrial users and communities.

The establishment of the Project would see the delivery of highly reliable and competitively priced electricity from the NEM to the NWMP and communities in NWQ.

On the basis of the information presented in the EIS and the potential regional benefits of the Project, it is recommended that the Project proceed with conditions set by the Coordinator-General under Section 39(1)(a) of the SDPWO Act.