

Chapter 2

Project Justification and Feasible Alternatives

2.0 Project Justification and Feasible Alternatives

2.1 Project Justification

2.1.1 Current and future energy needs

In 2017, the Queensland Department of Energy and Water Supply prepared the '*Powering Queensland Plan*' which sets out the Queensland Government's strategy to guide the State through the short-term and long-term challenges facing Australia's energy markets. The Plan's objective was to support the transition to a cleaner energy sector, create new investment and jobs, and address Queensland's current and future energy needs.

The '*Powering Queensland Plan*' identified that Australia's energy markets are facing significant challenges relating to electricity and gas prices, system security, gas availability, and energy and climate policy (Department of Energy and Water Supply, 2017). These challenges are being driven by closure of ageing coal-fired generation and gas supply restrictions in southern states, a lack of investor confidence and an uncertain national policy. These challenges are resulting in higher prices for households and businesses, and if left unaddressed may threaten energy security and Australia's ability to meet its emissions reduction targets.

2.1.2 The Kidston Renewable Energy Hub

Genex is seeking to establish the Kidston Renewable Energy Hub, a combination of solar and pump storage hydro power generation, at the old Kidston mine approximately 270 km north-west of Townsville. Stage One comprises a 50 megawatt (MW) solar farm which is now operational. Stage Two is currently proposed to comprise up to 250 MW pumped storage hydro project and up to 270 MW solar farm.

Genex has requested Powerlink Queensland provide a connection for Stage Two of the Kidston Renewable Energy Hub to the Queensland Transmission Network.

2.1.3 Renewable energy

As a connection to a renewable energy development, the Project is generally consistent with a number of international, Commonwealth, State and regional/local agreements, policies and plans that are based around responding to climate change and the development of renewable energy infrastructure. These policies include The Paris Agreement, The Kyoto Protocol, the Commonwealth Renewable Energy Target, and the National Strategy on Ecological Sustainable Development.

Renewable resources offer a contribution to the long term alternative energy supply and have several advantages over conventional fossil fuels. Renewable resources:

- create virtually no carbon dioxide (CO₂) or other air pollutants during their operation and as such do not contribute to either global climate change or local air pollution
- contribute to a reduction in our dependence on the finite reserves of fossil fuels, which are being rapidly depleted
- reduce dependence on oil and gas imports and increase self-sufficiency in energy production.

2.1.4 Project benefits

The Project potentially provides a range of social, economic and environmental benefits, including:

- supporting major renewable energy projects
- supporting both the Commonwealth Renewable Energy Target and State planning intent
- supporting the diversification of Queensland's electricity generation mix
- creation of jobs during the construction period and for ongoing operation.

2.2 Feasible Alternatives

Electricity transmission infrastructure is recognised as the most economic and technically feasible solution for bulk power transfer from large scale power stations (such as the Kidston Renewable Energy Hub) to the Queensland Transmission Network.

Powerlink Queensland has undertaken studies to identify feasible network solutions to address Genex's requirements and the solution presented in this EAR have been identified as the least cost solution to addressing these requirements. Ergon Energy's existing transmission and distribution network in the region does not have sufficient capacity to allow connection of Kidston Renewable Energy Hub to the Queensland Transmission Network.

2.2.1 Identification of the preliminary alignment and substation location

A Corridor Selection Report (CSR) was prepared in 2016/17 which identified a preferred corridor and Preliminary Alignment for the construction and operation of the proposed transmission line to connect the Kidston Renewable Energy Hub to Powerlink Queensland's existing transmission network, with a connection point identified near the existing Mount Fox communications site along the Ross to Chalumbin 275kV transmission line (Powerlink, 2017). The objective of the CSR was to identify a preferred study corridor and preliminary alignment that, on balance, offered the most appropriate location for the proposed transmission infrastructure, taking into account social, economic and environmental factors.

The CSR was developed based on a range of detailed desktop assessments, interrogation of existing agency data, aerial reconnaissance and stakeholder and landholder engagement. The following matters were considered and informed by feedback from local representatives and landholders:

- topography
- hydrology
- environment
- native title
- cultural heritage
- tenure
- Local Government Areas
- residences
- proximity to population
- land use
- existing infrastructure
- State planning interests and other State policy.

The CSR considered two study corridor options ('Option B' and 'Option C'), with a third corridor ('Option A') being excluded from further study due to its:

- intersection with the Mount Fox section of Girringun National Park
- intersection with the Newcastle Range – Oaks Nature Refuge
- proximity to Mount Fox Primary School
- proximity to Kidston airstrip
- highest relative intersection of steep terrain, major watercourse crossings, 'of concern' vegetation and potential habitat for protected species, including cassowary habitat near Mount Fox.

Study Corridor Option C was selected as the preferred study corridor as it offers the lowest potential for environmental, social and economic impact and incorporated stakeholder and landholder feedback (Powerlink, 2017). A Preliminary Alignment for the transmission line was identified within Study

Corridor Option C. The Preliminary Alignment is predominantly co-located with existing Ergon infrastructure in the region, namely the Greenvale 66kV and Kidston 132kV lines. Co-location provides a range of social, environmental and economic benefits compared to a 'greenfield' alignment. Since October 2017, extensive stakeholder and landholder consultation, environmental and technical field studies have been undertaken to refine the Preliminary Alignment. Further details on the consultation process are contained in Chapter 28 Community and Stakeholder Consultation. The Draft Alignment proposed in this EAR reflects the outcomes of these further studies and consultation.

2.2.2 Electricity infrastructure alternatives - underground transmission lines

The CSR considered underground transmission lines as an alternative construction method, however they were not determined to be feasible based on the following factors.

- Underground construction is not considered viable where sufficient space for overhead infrastructure exists. Underground construction is significantly more costly (approximately 5-10 times) than overhead construction.
- Underground transmission lines require the easement to be kept clear of vegetation. This is necessary to ensure the cables are not damaged by tree roots, other vegetation or anthropocentric activities.
- Increased erosion potential during construction as sections of the trench (possibly up to 1 km or more) may be open for a period while the cables are installed, tested and then backfilled. A consequence of this can also be the temporary disruption to the community, due to access and traffic constraints.
- Overhead infrastructure can be carefully sited to span sensitive environmental and cultural features.
- In the event of a fault it also often takes longer to restore service on underground transmission lines, with fault identification more difficult than equivalent overhead transmission lines.

2.2.3 Substation site selection process

The proposed locations for the Mount Fox and Copperfield River substations outlined in this EAR have been determined in line with Powerlink Queensland's Site Selection Guideline ASM-GDL-A588593 which requires the following factors to be considered:

- general location, with regard to transmission line arrangements and load/generator location
- anticipated development size to ensure adequate space for safety requirements and necessary infrastructure
- site environmental constraints and physical features
- surrounding land usage
- accessibility for construction, maintenance, augmentation and refurbishment
- local government and community support
- economic considerations such as the acquisition of land.

A key design objective for substations is the need to maintain a safe operating environment both for the public and for operational personnel, and achieving a high reliability of electricity supply at the least cost consistent with a low environmental impact.