

2018-22

POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.01647
Biloela to T027 Moura 132kV
Transmission Line Replacement

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**ID&TS – Reset 2017/18 to 2021/22
Project Proposal for CP.01647 BS1110
T026 Biloela to T027 Moura 132kV Transmission
Replacement**

Document Approval

	Name	Position
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1. Executive Summary

The 132kV transmission line between T026 Biloela substation and T027 Moura substation (BS1110) was first established in 1965 to support the expansion of coal mining and the growing regional communities. The built section supports a single 132kV feeder F71110/3.

BS1110 located from the existing Biloela tee to Moura Substation is 48km in length and consists of 128 structures (122 suspension and 6 tension structures)

The condition of the transmission line has deteriorated over time and has now reached its end of life. The need to maintain the 132kV circuit from T026 Biloela to T027 Moura substation to support the western 132kV network is firmly established.

Consideration to undertake a transmission line refit was assessed as not providing the required life extension to make it economically viable when compared to transmission line replacement in this instance.

This project proposal has been developed with the objectives outlined in the Project Scope Report, Version 1, dated 1st July 2015. Whilst preparing this project proposal, it was identified that scope amendments were required due to other concurrent project undertaking the same works. All scope amendments have been discussed and agreed by the project sponsor.

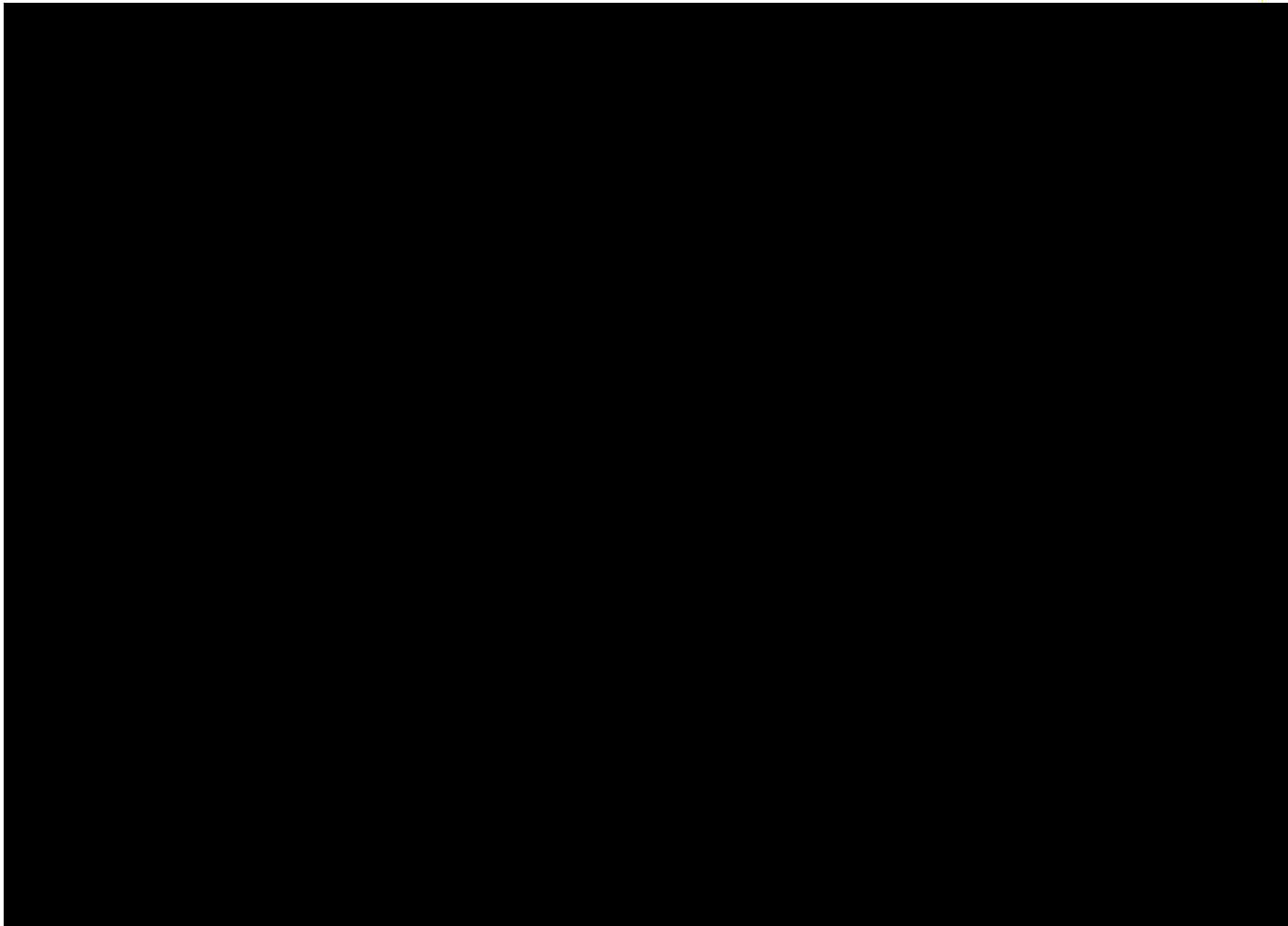
The objective of this project is to replace the existing 48km of single circuit 132kV transmission line with a new 48km double circuit transmission line by June 2021.

The estimate for the cost components has been calculated by utilising Powerlink’s Base Planning Object Rates (BPO’s). While key groups were consulted for this project proposal, design advices have not been created.

2. Project Definition

2.1 Project Scope

Briefly, the project consists of replacing 48km of single circuit 132kV transmission line between T026 Biloela Tee and T027 Moura substation, decommission and recover the existing transmission line conductor, tower structures and transmission line fittings and hardware. Construct a new double circuit 132kV transmission line between Biloela Tee and T27 Moura



2.1.1 Transmission Line Works - Construction

Design, procure, construct and commission 48kms of 132kV double circuit steel tower transmission line between Biloela Tee and T027 Moura substation. The double circuit transmission line is to be built [REDACTED] with minor deviations where necessary. The proposed line route alignment is shown in Figure 1.

- Required minimum summer emergency rating 135MVA per circuit. It is assumed that a design using single neon conductor will meet this condition;
- The transmission line is to include a single 48 fibre OPGW's and a suitably sized OHEW to share fault current evenly;
- Install new landing spans from tower structures to substation landing beams for all feeders associated with this line;

2.1.2 Transmission Line Works - Demolition

- Decommission, and recover the existing 132 kV single circuit transmission line (approx 48kms) between Biloela Tee and Moura This includes all towers, conductors and line hardware;
- Rehabilitate each tower site to ensure long term stability;



- Rehabilitate the cleared corridor, where required, in a manner that suits the location and to ensure long term stability
- For access tracks no longer required, rehabilitate to ensure long term stability.

2.2 T026 Biloela Substation Works

- The uprating of landing span droppers and feeder bay hardware to match the transmission line feeder ratings will be undertaken by CP.01649

2.3 T027 Moura Substation Works

- Installation of landing span, droppers and bridging to match the transmission line feeder ratings.
- Modify feeder protection settings.

2.4 Major Scope Assumptions

- Due to constraints along the existing corridor and outage restriction to F1110/3 it is assumed that a new double circuit 60m wide project corridor be established from the Biloela Tee to T027 Moura Substation.

- All easements and approvals will be in place to allow site access by the nominated Site Access Date(SAD).
- The estimate is based on a connection from the Biloela tee to the Existing Moura Substation. Transmission line and substations works associated with the Biloela tee to Biloela Substation are to be constructed under CP.01649.
- The new double circuit transmission line is based on E-Series 132kV cyclonic lattice steel structures with an assumed easement width of 60m. It was estimated that there will be 102 suspension structures and 18 tension structures with an average tower height of +9m and an average span length of 400m.
- Tower structures are based on the use of Powerlink’s E-Series tower design as Powerlink does not have a Neon conductor tower suite. It is expected that a Neon conductor tower design, having a lower capacity, would provide a cost saving of approximate \$500,000 in construction although are far outweighed by development costs, expected to be in the order of \$+3M. It is assumed that the E-Series towers will remain the current structure design for this project.
- For the construction of the Moura substation works, it is assumed that the contractor will source local accommodation. It is assumed that these costs are included in the contractor establishment rate.



- For the new line construction it is assumed that one 66kv Ergon line undercrossing will intersect the proposed transmission line route. It is assumed outages to this 66kv will be limited. Cradle blocking and or undergrounding costs have been estimated at \$200K.
- For the line removal one 66kV Ergon line undercrossing and one smaller 11kV line undercrossing is known to intersect the existing transmission line. It is assumed that the existing lines can be decommissioned under short outages at a combined cost of \$56k.
- A total of 10 minor roads and 6 major road crossing intersect the new and old alignment. An allowance of \$200k has been made for the establishment of rural turnouts of local government roads.
- A small section of the alignment traverses a steep range approximately 24kms to the west of Biloela, refer figure 2. It is assumed that moderate benching works would be required for a total of 10 tower sites. Benching works are likely to consist of a 30*30m level pad allowing a sufficient working area for a 200t crane and a 55m EWP to work. An allowance of \$35K per bench site has been assumed in this estimate.
- It is assumed that 30 tower sites will require minor benching at a cost of approximately \$10K per site.
- It is assumed that 20 creek crossings will be needed at a cost of \$5k each.
- Due to challenging terrain, poor soils, varying clearing techniques and the likelihood of some challenging landowner constraints, it is preferred that the Clearing and Access works is constructed separate to the lines contract under the direction of Powerlink. It is assumed the Clearing and Access contractor would commence prior to the transmission line contractor working progressively in advance.
- The existing and proposed project corridors are known to have significant weeds, which are widespread throughout the area. This includes Parthenium which is known to be across the existing project corridor. A Pest Management Plan will be developed with the intention to minimise the spread of weeds along the project corridor. 10 major weed zones have been assumed for the construction and demolition of the transmission line for a combined cost of \$750K. The establishment and operation of wash-down facilities are included as part of this estimate.
- In the absence of geotechnical data the following foundation type spread has been assumed:
 - 50% bored socketed
 - 50% undercut
- It is assumed that geotechnical investigations would be carried out on every 10th transmission structure. It is also assumed that a specialist RPEQ engineer would be engaged to verify soil and rock classifications for foundation nominations during construction.
- It is assumed that a fly in and fly out workforce would be used working a 3 & 1 week roster. It has been assumed that workers can be accommodated at the nearby towns of Biloela and Moura.
- For the construction of the Moura substation works, it is assumed that the contractor will source local accommodation. These costs are included in the contractor establishment as part of this estimate.
- The proposed transmission line traverses a developing mining lease. It is assumed that subsequent mining developments and activities will not impact construction.



- It has been assumed that construction materials, such as water, gravel and rock can be obtained within 50kms from the construction work front.

2.5 Scope Exclusions

- Easement acquisition and associated costs.
- The proposed estimate is based on a nominated alignment route of 48km. Variances of km's (+/-) have not been allowed as part of this project pricing and should be adjusted accordingly after a detailed alignment selection process has been undertaken.
- Deviations caused from, cultural heritage, environmental, and other site specific constraints have been excluded from this estimate.
- No allowance for any mines EBA, IR agreements or workplace health and safety requirements above that which would be expected on normal Powerlink construction sites.
- No allowance for contributions to local government road use agreements and the associated road impacts cost have been allowed for in this estimate.
- The uprating of landing span droppers and feeder bay hardware at Biloela and Moura will be respectively undertaken by CP.01649 and CP.01549. These works are excluded from this project proposal.
- Third Party wash-down requirements and or the establishment of biosecurity huts are excluded from this pricing.
- Increases to structure heights over Good Quality Agricultural Land, to maintain electrical clearances for the allowance of specific farming equipment has not been allowed and is excluded from this estimate.
- No allowances have been made for the increase of workforces to meet the requirements of the Queensland Government Building and Construction Training Policies. It is assumed the contractor workforce would have existing training and development programs in place meeting these requirements. An increase in labour workforce to meet the Queensland Government Building and Construction Training Policies requirements has been excluded from this pricing.
- No allowance has been made for unseasonable weather events. E.g floods, cyclones, droughts.

3. Project Execution

3.1 Project Dependencies & Interactions

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.01549	Moura Switchyard Replacement	31 st October 2016	
Co-requisite Projects			
CP.01649	Callide to Biloela 132kV T/L Replacement	June 2021	
Other Related Projects			
██████	████████████████████		

3.2 Site Specific Issues

The proposed works are located within the Banana Shire councils. The nearest population centres are Biloela (pop 5808) and Moranbah (pop 1899).

Overall the study area is of rural character, dominated by cattle grazing with some cropping. The topography of the study area is highly varied from level or gently undulating alluvial plains with numerous creek and gully crossings, to a mountainous range as shown in Figure 2.

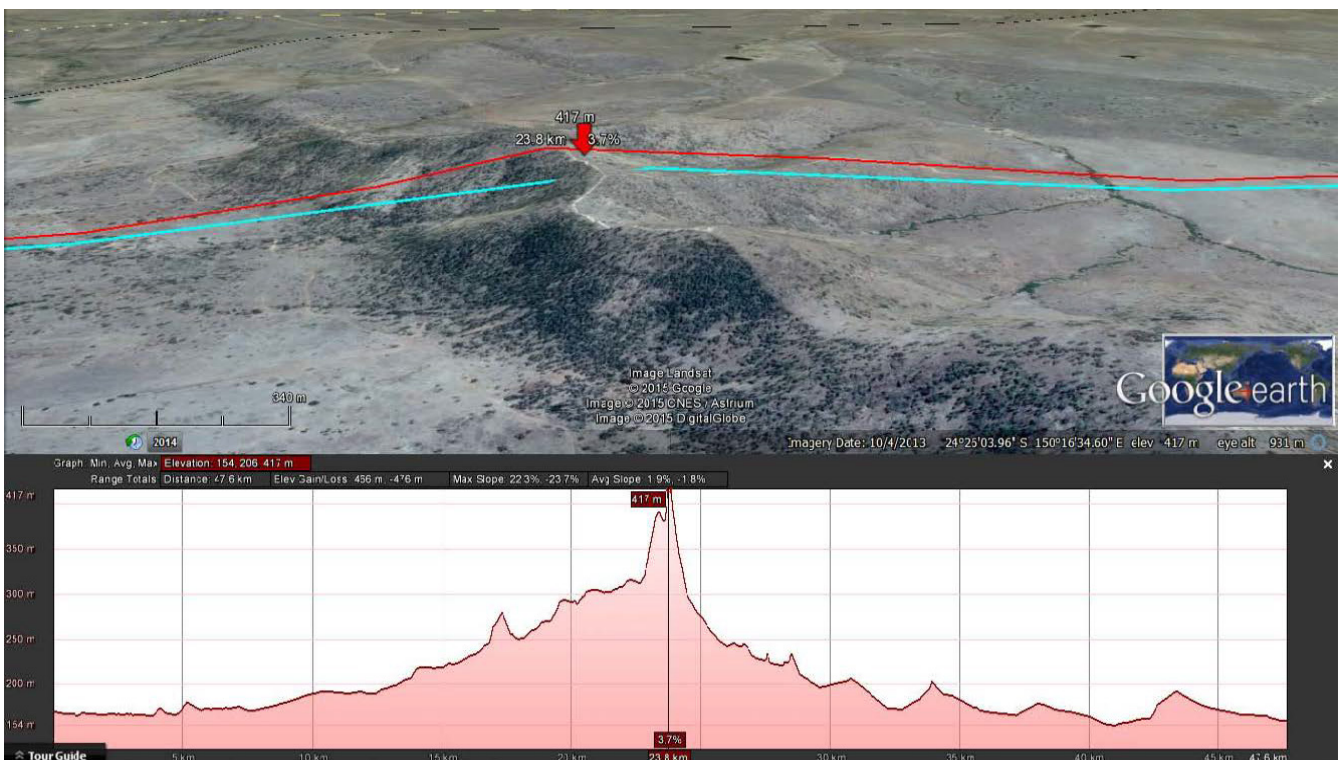


Figure 2 – Mountain Range Chainage 24kms

3.3 Project Delivery Strategy

- The new overhead line work and the decommissioning of the existing overhead line work will be outsourced using Powerlink’s Panel Agreement for Transmission Lines (PATL).
- Powerlink design will complete the design for Lines, Substation and Telecommunications work.
- Landing span cut-ins, secondary connections to live buildings, bus extensions, SAT, landing spans and dropper connections to line isolators will be performed by the Maintenance Service Provider (MSP).
- Final system integration will be by Ergon in conjunction with the Powerlink Commissioning engineer.

Project Delivery Strategy Matrix		
Design	Earthworks Design	Powerlink
	Civil Design	Powerlink
	Electrical Design (Primary)	Powerlink
	Electrical Design (Secondary) – Protection	Powerlink
	Electrical Design (Secondary) – Automation	Powerlink
	Transmission Line Design	Powerlink
	Telecommunication Design	Powerlink
Construction	Earthworks Construction	N/A
	Civil Construction	N/A
	Electrical Construction / Installation	N/A
	Transmission Line Construction & Removal	CAP, PATL & MSP
Testing	Substation Testing – FAT	SPA Contractor
	Substation Testing – SAT	MSP
	Substation Testing – Cut-Over	MSP
	Telecommunication Testing	MSP



3.4 Proposed Sequence of Works

3.4.1 Project Schedule

The latest date for the commissioning of the new assets included in this scope and the decommissioning and removal of redundant assets, where applicable, is June 2021.

High Level Schedule

- Project Approval : March 2019
- Design & Field Planning Complete : Oct 2019
- Award Tender : Jan 2020
- Site Access Date : April 2020
- Complete construction of new line : Feb 2021
- Complete demolition of old line : June 2021
- Project Completion date : June 2021

3.4.2 Project Staging

Major project stages of the project are considered to be:

Stage	Description/Tasks
1	Construct new 48kms Double Circuit T/L from Biloela Tee to Moura Substation
2	De-energise F1110/3, cut in new double circuit T/L into Biloela Tee and Moura Substation.
3	Decommission and remove F1110/3

3.4.3 Network Impacts and Outage Planning

Preliminary outage advice from Network Operations has indicated that long duration outages will not be available on F1110/3. In order to overcome this issue the estimate is based on building a new transmission line on a new easement, maintaining the feed into Moura until the new line will be cut in using short duration outages.

3.5 Project Health & Safety

The implications of relevant workplace health & safety legislation in delivering the proposed solution have been considered in preparing this estimate. In particular, this estimate includes an allowance for typical safety related activities required in the delivery phase of the project.

This project will be undertaken in accordance with Powerlink’s Workplace Health and Safety Specification. This project is expected to have typical safety issues involving Brownfield substation and Greenfield transmission line works



3.6 Project Environmental Management

This project will be undertaken in accordance with Powerlink’s Environmental specification. If approved, the construction works of this project will be subject to the requirements outlined in the project EIS and EMP. Allowances and risks have been included in this proposal.

4. Project Risk Management

CLIMATE

BOM data at the Biloela DPI station, located at the eastern end of the project corridor indicates that the region is likely to encounter approximately 20 days of weather for a rain event >10mm. Rain events such as these are considered and are allowed for as part of this estimate. In the case of unseasonal weather, rainfall quantities and its ongoing effects can be significantly more than those derived from BOM data. Also, at several stages during this project there will be short timeframes to complete works under outages. In the event that weather delays these works, significant costs could be incurred. An allowance for climate impacts has been included in the estimate.

DESIGN

Site conditions along the indicative alignment have been limited to desktop analysis. This was undertaken using PQ Constraint mapping data, PQ maps, topographic maps and information obtained from the Bureau of Meteorology. Data sources for the purpose of providing an estimate are considered high level. Potential deviations and design changes may occur due to cultural and heritage, environmental, landholder, topographical, geological constraints. An allowance for design risk has been included in the estimate.

CONSTRUCTION

Site conditions along the indicative alignment have been limited to desktop analysis. This was undertaken using PQ Constraint mapping data, PQ maps, topographic maps and information obtained from the Bureau of Meteorology. Data sources for the purpose of providing an estimate are considered high level. Potential deviations and design changes may occur on the due to cultural and heritage, environmental, landholder, topographical, geological constraints. An allowance for construction risk has been included in the estimate.



5. Project Estimate

5.1 Estimate Summary

Quote Summary - CP.01647 BS1110 T026 Biloela to T027 Moura 132kV Transmission Replacement			
The quotation at current cost levels and escalated for completion by 30 June 2021 at 4.1% per year, for CP.01647 BS1110 T026 Biloela to T027			
CP.01647 Quotation in \$,000 AUD	Base Cost Levels	Escalated to Compln.	Comment (Costs @ Base Cost Levels)
Transm. Line #1 - T026 Biloela to T027 Moura			132/110kV DCST/NC Neon OPGW (E Series) Assumptions: Total Line Length = 48Km Heavy Strain/Termination D1T70E+9 required: 9 Medium Strain D1T40E+9 required: 9 Suspension D1S0E+9 required: 102 Average span assumed: 400m Average ground clearance assumed: 12m (for cultivation areas)
			Dismantle exist 132kV transmission line /km (Demolition costs)
			Geotech investigations
			Benching (Moderate and Minor Sites)
			Switching Costs
			Line Allowances (Wet Weather, Major/Minor Road crossing, Distributions Lines crossing, Bio security (Fire ants, weeds, pathogens)
Substation Works(T026 Biloela and T027 Moura)			Protection settings changes and Cut in costs
Telecomms Work			Telecomms work
Project Concept, Investment & Planning, Overall Project Mngt and Statutory Costs			Overheads
TOTAL QUOTE (EXCL RISKS)	36,742	44,891	
Risk Estimate	2,365	2,365	
TOTAL QUOTE (INCL RISKS)	39,107	47,256	

5.2 Asset Disposal Table

CP.01647 Asset Disposal. Values current at 30th June 2016							
Functional Loc.	Description	Asset	Subnumber	Book val.	% Write-off	Total Write-off	Currency
1110	STR-0001 to Moura F7110/3	102494	0	1,266,682.00	100%	1,266,682.00	AUD
Total						1,266,682.00	AUD



6. References

Document name and hyperlink (as entered into Objective)	Version	Date
Project Scope Report	1	1/07/2015
Estimate Detail	1	27/08//2015