2018-22
POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.02415
Greenbank to Mudgeeraba 275kV TL Refit

Delivering better value

ID&TS - Reset 2017/18 – 2021/22 Project Proposal for CP.02415 Greenbank – Mudgeeraba 275kV TL Refit

Document Approval		
	Name	Position
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Contents

1. Executive Summary

The circuits between Greenbank and Mudgeeraba comprise 2 single circuit 275kV transmission lines feeders 835 and 836 (Built Sections 1018 and 1019) constructed in the mid 1970's. Each feeder consists of 165 structures comprising 50 tension and 115 suspension structures. The transmission line is an essential component of the transmission network supplying the southern Gold Coast area and has an electrical capacity which meets long term requirements. The transmission line has deteriorated due to natural ageing, and the condition of the line needs to be addressed to ensure its long term safety and reliability.

The objective of this project is to undertake refit works to extend the reliable life of the transmission line by October 2019.

2. Project Definition

2.1 Project Scope

The following scope presents a functional overview of the desired outcomes of the project. The proposed solution presented in the estimate must be developed with reference to the remaining sections of this Project Scope Report, in particular *Section 1.7 Matters to Consider*.

Briefly, the project consists of member replacement, surface treatment and painting of 2 single circuit 275kV transmission lines each approximately 65km and comprising 165 structures.

2.1.1 Transmission Line Works

The following shall be addressed within the scope of work:

- Access track suitability for contractor works
- Site establishment
- Surface preparation and painting of 330 towers per current Powerlink standards.
- Review all tower leg / stub members and encapsulate where the concrete to steel interface is showing signs of corrosion.
- Replacement of 5% of all tower nuts and bolts.
- Replacement of 1% of steel members per tower.
- Replacement of:
  - Insulators.
  - Conductor hardware.
  - Vibration dampers.
  - Tower accessories including signs and anti-climbing barrier.
  - All step bolts.
- Replacement of existing two (2) overhead earth wires per circuit with one (1) OPGW and one (1) OHEW of equivalent and matching rating per circuit, and strengthening of earth peak as required.
- Review of drainage and clearing of all growth around tower foundations.
- Review of the electrical design to confirm electrical clearances and insulation levels.
- Review and documentation of the structural capacity of the structures.

- Tower earthing to be upgraded to the current standard
- Update SAP records and drawings

2.2 Major Scope Assumptions

- Preliminary advice from NetOps suggests that single circuit outages will be possible. However, outages will not be possible during the Summer load period (October to March). It is assumed that long term outages will be possible from April to September.
- Approximate quantities of bolts, nuts and members as well as the surface area of each tower type provided by TLD were used for the estimate.
- All insulators will be replaced.
- All step bolts and fall arrest brackets will be replaced.
- It is assumed that 20% of tower accessories including signs and ACDs will require replacement or repair.
- It is assumed that 10% of foundations will require minor works such as concrete encapsulation at the leg-concrete column interface.
- It is assumed that all towers will require additional earthing.
- Garnet blasting will be the surface preparation method used. Drop sheets and fencing will be used to contain the blasting media. This will be an important control as the easement runs through residential areas.
- The painting system assumed for this project is a two coat application of metallic zinc to achieve a dry film thickness of 120 microns in two coats.
- Insulator assembly lengths will not vary, avoiding any potential electrical clearances issues. Clearance drawings shall be produced during project execution.
- It is assumed that the access tracks originally formed for construction of the transmission line are mostly intact, and sufficient for 4wd access. An allowance has been made in the estimate for minor access tracks upgrades.
- It is assumed that minor benching will be required on a considerable portion of the tower sites to allow for EWP set up. An allowance has been included in the estimate for this.
- It is assumed that a majority of the works can be scheduled to avoid the typical wet season months from December to April.
- Based off existing environmental work plans, a total of 4 weed wash-downs are expected along the line. An allowance of $160,000 has been included as part of this estimate for wash-downs.
- The Refit Contractor and O&FS will work simultaneously on the same built section to complete refit, OHEW and insulator replacement works within the same outage. Sufficient distance will be provided between the work groups to comply with Principal Contractor requirements.
- Minimum vegetation clearing and restoration works would be required to facilitate works.
- The estimate is based on the assumption that 42 LV undercrossings will require works to protect/maintain them during OHEW replacement works. A nominal amount of $20,000 has

been allowed for organisation and implementation of the required works for each undercrossing.

- Two major road crossings and 20 minor road crossings have been allowed for. Nominal figures of $80,000 and $10,000 have been allowed for each of the major and minor road crossings, respectively. These figures have been added to allow for extra costs involved in OHEW replacement works at road crossings.
- A nominal figure of $210,000 has been allowed for design and strengthening of tower earth peaks to allow for the OHEW replacement.

2.3 Scope Exclusions

- Any increase in scope after detailed condition assessments have been conducted.
- Any foundation works other than minor repairs to the leg / concrete column interface.
- No allowance has been included for erection of scaffolding.
- No environmental offsets have been included in this estimate.
- Installation of any additional structural members to bring the structures up to current design standards.
- No allowance has been included for an unexpected feeder return to service.
- No allowance has been made for unseasonable weather events. E.G floods, cyclones etc.

3. Project Execution

3.1 Project Dependencies & Interactions

As it is expected that the insulator/hardware replacement works will be undertaken by O&FS, completion of these works is dependent on availability of resources. Any concurrent projects requiring O&FS's lines resources will impact this project.

3.2 Site Specific Issues

Based on a desktop study, all towers appear to be easily accessible by a 4WD vehicle in the dry season, but access could be limited after wet weather in low lying areas around the local creeks and rivers. For most part, the line traverses flat to undulating terrain with minimal vegetation.

3.3 Project Delivery Strategy

- The design of suitable replacement members would be performed by Refit Panel Contractor;
- The Refit Panel Contractor will supply and fit replacement bolts, nuts and steel members and carryout other related Refit works such as replacing anti-climbing barriers, signage etc;
- The Refit Panel Contractor will paint the towers;
- O&FS will replace the insulators and line hardware; and
- Switching for outages, disconnecting the transmission lines and line diversions will be performed by O&FS.

3.4 Proposed Sequence of Works

3.4.1 Project Schedule

To meet the required commissioning date of October 2019 full project approval will be required by 1st April 2017.

High Level Schedule

- Project Approval : April 2017
- Detailed Condition Assessments : June 2017 – July 2017
- BS1018 Refit works : January 2018 – September 2018
- BS1018 OHEW/Insulator Replacement : April 2018 – September 2018
- BS1019 Refit works : January 2019 – September 2019
- BS1019 OHEW/Insulator Replacement : April 2019 – September 2019
- Project Completion : 31st October 2019

3.4.2 Project Staging

Provided that single circuit outages will only be available between April and September, the works on each feeder will be completed over this period. The easement will be split up such that the Refit Contractor and O&FS can work simultaneously to complete their scope of works within the April to September outages.

3.4.3 Network Impacts and Outage Planning

Preliminary outage advice from NetOps has indicated that single circuit outages will be possible. However, outages will not be possible during the Summer load period (October to March). It was also stipulated that a fast restoration plan is required, as any outage would be high risk with the potential of market impact. For these reasons, it is expected that all works will be undertaken under a SAHVEA Access Permit.

3.5 Project Health & Safety

The nominated Principal Contractor shall manage work and safety in accordance with Powerlink and WH&S legislative requirements. Principal Contractor WHS documentation such as WHS Management Plan (WHSMP), High Risk Construction Work Safe Work Method Statement (SWMS) are to be received 14 days prior to work commencing and must be reviewed by Powerlink ID&TS Safety Team.

3.6 Project Environmental Management

The project will be undertaken in accordance with Powerlink Environmental specification. If approved the construction works of this project will be subject to the requirements outlined in the project Environmental Management Plan. Prior to undertaking these works the following key environmental considerations should be considered:

- Wildlife - Impacts on Avifauna nesting sites and other habitat features. Insulator replacement may require bird nest removal and/or replacement. Standard EMP, EWP, and SMP control measures should be followed.

- Biosecurity - Spread of noxious flora from construction works within the easement is a likely possibility. Ensure weed hygiene protocols are followed and wash down facilities are clearly identified.

- Hazardous substances – Contamination of areas nearby to the easement from blasting or painting media is possible. Appropriate controls will need to be in place to manage the risk of environmental harm from these substances.

4. Project Risk Management

CLIMATE

BOM data indicates that the region is likely to encounter approximately 28 to 35 days of rain >10mm per year, and 9 to 13 days of rain>10mm between April and September when the majority of the work is planned. 21 days of wet weather delays have been 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. An allowance of 1% risk of the overall estimate has been determined and allowed for as part of this project.

DESIGN

Until a detailed design review can be completed the ability for the Refit Contractor or O&FS to undertake their work is uncertain. An allowance of 1% risk of the overall estimate has been determined and allowed for as part of this project.

CONTRUCTION

The estimate is based on an assumed level of deterioration along the three built sections. Until detailed condition assessments have been completed, there exists a risk that this level of deterioration has been underestimated. Also, potential delays may occur due to environmental, landholder, and access constraints. A combined allowance of 4% risk of the overall estimate has been determined and allowed for as part of this project.

5. Project Estimate

5.1 Estimate Summary

Quote Summary : CP.02415 Greenbank – Mudgeeraba 275kV TL Refit

The quotation at current cost levels and escalated for completion by 31 October 2019 at 4.1% per year, for CP.02415 Greenbank – Mudgeeraba 275kV TL Refit is as follows;

CP.02415 Quotation in $,000 AUD	Base Cost Levels	Escalated to Compln.	Comment (Costs @ Base Cost Levels)
Transm. Line #1 Greenbank – Mudgeeraba 2 single circuit 275kV transmission lines each approximately 65km and comprising 165 structures.	**52,396**	**58,868**	**Greenbank – Mudgeeraba 275kV TL Refit (330 towers - structure bolt/member replacement,insulators, conductor hardware,step bolts, vibration dampers, tower accessories replacement and painting)**
Project Concept/Investment & Planning, Statutory Costs and O&FS -Network Ops	718	785	Overheads
TOTAL QUOTE (EXCL RISKS)	**53,114**	**59,653**	
Risk Estimate	**2,925**	**2,925**	
TOTAL QUOTE (INCL RISKS)	**56,039**	**62,578**	
Transm. Line #2 Greenbank – Mudgeeraba : OHEW Refit	[redacted]	[redacted]	Greenbank – Mudgeeraba 275kV OHEW Refit - 11mm2 EW + 24 Fibre OPGW
	[redacted]	[redacted]	Mgt, Design & Compliance
	[redacted]	[redacted]	Procurement E/W OPGW & Hardw are
	[redacted]	[redacted]	EW/OPGW Retrofit by MSP including EWP Hire
	[redacted]	[redacted]	Other Construction Costs - Road Crossings ($370k), Undercrossings ($864k), Steel ($204k), OPGW J Boxes ($85k) & Washdow n bays ($74k)
	[redacted]	[redacted]	Wet Weather Allow ance
Project Concept/Investment & Planning, Statutory Costs and O&FS -Network Ops	[redacted]	[redacted]	Extra Qleave
TOTAL QUOTE EW REFIT (EXCL RISKS)	**8,854**	**10,014**	
Risk Estimate EW REFIT	**517**	**517**	
TOTAL QUOTE EW REFIT (INCL RISKS)	**9,371**	**10,531**	
TOTAL QUOTE V2 (EXCL RISKS)	**61,969**	**69,667**	
Risk Estimate V2	**3,442**	**3,442**	
TOTAL QUOTE V2 (INCL RISKS)	**65,411**	**73,108**	

5.2 Asset Disposal Table

No asset disposal is required for these works.

6. References

Document name and hyperlink (as entered into Objective)	Version	Date
Project Scope Report	1	28/8/15
Estimate Detail	1	23/12/15