

# 2018-22

## POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.02355

Ashgrove West Substation Rebuild

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ID&TS-PRG-RPT-A2331384

Version: 01

**ID&TS – Reset 2017/18-2021/22 Project Proposal for CP.02355 Ashgrove West Substation Rebuild**

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### Document Approval

	Name	Position
Prepared by		Project Manager
Reviewed by		Team Leader Projects
Approved by		Group Manager Infrastructure Delivery



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## 1. Executive Summary

Ashgrove West Substation was established in 1979 to cater for the increased electrical demand in the Brisbane central business district and the expanding residential areas to the North West. Initial development included four 110kV feeder bays, a bus coupler bay and two transformer bays.

The original primary plant installed at Ashgrove West consists of dead tank circuit breakers with sulphur hexafluoride (SF6) insulation and compressed air pneumatic operating mechanism. The equipment is now approaching 40 years of age and is now obsolete, with the manufacturer having ceased support for this type of equipment. Further, this type of equipment is becoming less reliable due to issues associated with SF6 gas containment and defects with seals on the compressed air systems. Previous attempts to repair or refurbish this aged plant have had a very limited success at very high cost.

Due to the staged expansion of the substation there is also a mixture of types and generations of secondary systems. A portion of the secondary systems are expected to need replacement in the medium term due to equipment obsolescence, as a result of lack of manufacturer support, and individual asset condition.

The objective of this project is to replace all the original circuit breakers, associated instrument transformers and concrete support structures, and selected secondary systems at Ashgrove West Substation 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 the in-situ replacement of selected 110kV primary plant and selected secondary systems on a like for like basis.

#### 2.1.1 Transmission Line Works

Not applicable.

#### 2.1.2 T030 Ashgrove West Substation Works

##### Primary Plant

Design, procure, construct and commission replacement 110kV circuit breakers and instrument transformers in following bays:

- one (1) 110kV bus section bay;
  - 2-3 bus section;
- one (1) 110kV transformer bay;
  - T3 110/33kV transformer;



- four (4) 110kV feeder bays;
  - feeders 7256 and 7257 to Upper Kedron;
  - feeder 781 SSKVG;
  - feeder 782 SSMLT;
- replace all associated concrete support structures & foundations;
- decommission and recover all redundant equipment; and
- update drawing records, SAP records, config files, etc. as necessary.

### Secondary Systems

Replace selected secondary systems equipment, including panels, associated with the following 110kV bays, with equipment that conforms to the current Powerlink design standard:

- four (4) 110kV feeder bays;
  - feeders 7256 and 7257 to Upper Kedron;
  - feeder 781 SSKVG;
  - feeder 782 SSMLT;
- replace metering systems associated with feeders 781 and 782;
- replace AC and DC supply system, marshalling kiosks and control cables;
- replace Human Machine Interface (HMI);
- replace OpsWAN and SCADA equipment;
- integrate new secondary systems with existing secondary systems at site;
- decommission and recover under frequency load shedding protection;  
**Note:** this functionality has been transferred to Energex and does not need replacing.
- decommission and recover all redundant equipment;
- update drawing records, SAP records, config files, etc. as necessary; and
- coordinate with Energex to ensure all Energex-owned remote end secondary systems are modified to ensure compatibility with the new secondary systems at Ashgrove West.

#### 2.1.3 H023 Upper Kedron Substation Works

- modify protection, protection signalling, control, automation and communications systems associated with feeders 7256 and 7257 to ensure compatibility with the new secondary systems at Ashgrove West; and update drawing records, SAP records, config files, etc. accordingly.



## 2.2 Major Scope Assumptions

Availability of Maintenance Service provider resources to complete the multi stage works.

This strategy would require early approval for the ordering of circuit breakers with a 32-38 week delivery.

## 2.3 Scope Exclusions

Management of and disposal of PCB equipment or asbestos material is not provided.

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## 3. Project Execution

### 3.1 Project Dependencies & Interactions

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
	Nil		
Co-requisite Projects			
	Nil		
Other Related Projects			
	Nil		

### 3.2 Site Specific Issues

### 3.3 Project Delivery Strategy

It is expected that the project will be delivered using a Substation Panel Contractor under a Construct Only contract. Powerlink is expected to perform the design with the Maintenance Service Provider performing the testing and commissioning.

This project requires the early approval to purchase circuit breakers or the approval date would need to be 1 month earlier in July 2017.

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	N/A
	Telecommunication Design	Powerlink
Construction	Earthworks Construction	SPA Contractor
	Civil Construction	SPA Contractor
	Electrical Construction / Installation	SPA Contractor
	Transmission Line Construction	N/A
Testing	Substation Testing – FAT	Powerlink
	Substation Testing – SAT	Powerlink
	Substation Testing – Cut-Over	Powerlink
	Telecommunication Testing	Powerlink

### 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 1<sup>st</sup> August 2017.

#### High Level Schedule

- Order long lead time plant : July 2017
- Project Approval : 1<sup>st</sup> August 2017
- Design Complete : January 2018
- SPA Construct contract awarded : March 2018
- Staged bay construction 1-2 : March 2018 – September 2018
- Staged bay construction 3-4 : March 2019– September 2019
- Staged bay test/commissioning : June 2018 – September 2019
- Final decommissioning/Tidy up : Completed at each stage.
- Project Completion : 31<sup>st</sup> October 2019

NOTE: This strategy would require early approval for the ordering of circuit breakers with a 32-38 week delivery.

### 3.4.2 Project Staging

Major project stages of the project are considered to be:

Stage	Description/Tasks
1	Outage on Transformer 3, CB 4432. Demolish existing structures and foundations. Construct foundations, erect HV plant, Test and commission. 16wks
2	Outage on Bus Coupler CB 4122. Demolish existing structures and foundations. Construct foundations, erect HV plant, Test and commission. 16wks
3	Outage on Feeder, F7822. Demolish existing structures and foundations. Construct foundations, erect HV plant, and Modify secondary system. Test and commission. 16wks
4	Outage on Feeder, F7812. Demolish existing structures and foundations. Construct foundations, erect HV plant, and Modify secondary system. Test and commission. 16wks
5	Outage on Feeder, F781. Demolish existing structures and foundations. Construct foundations, erect HV plant, and Modify secondary system & metering. Test and commission. 16wks
6	Outage on Feeder, F7822. Demolish existing structures and foundations. Construct foundations, erect HV plant, and Modify secondary system & metering. Test and commission. 16wks

### 3.4.3 Network Impacts and Outage Planning

Preliminary outage advice from Network Operations has indicated that outages associated with feeders F72572, F72562, F4432, F781 & F782 will be restricted to winter months only, April to August. The next contingency event on any of these feeders would place city load at risk. A contingency plan for return to service for next contingency event will required to undertake these works.

Outages associated with F4122 bus coupler bay would be available in winter and shoulder periods but restricted during summer.

All works would require negotiation with Energex.

### 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. Works would need to be complete in a live substation with adjacent bay energised. Appropriate control measure would be required to allow works to proceed safely.

### 3.6 Project Environmental Management

No specific environmental management implications for the delivery of this project have been identified.

## 4. Project Risk Management

Some allowances have been allowed in the estimate. Please see estimate for details.





Please refer to the assumptions and exclusion as these items have implications for the overall project risk.

## 5. Project Estimate

### 5.1 Estimate Summary

#### Quote Summary

The quotation at current base level and escalated for completion by 31/10/19 at 4.1% per year, for CP.02355 Ashgrove West Substation Rebuild is as follows:

CP.02355 Quotation in \$ AUD	Base Levels	Escalated to Compln.	Comment (Costs @ Base Levels)
T030 Ashgrove West Works			Replace 6 X 110kV CBs/CTs with Deadtank CBs for 1 x Bus Section, 1 x transformer bay and 4 x feeder bays. Replace Secondary Systems for 4 x 110kV Feeder bays plus metring , HMI, OpsWAN, SCADA,AC & DC System, MKs control cables
H023 Upper Kedron Works			Secondary System Changes at remote end for 2x 132kV feeders
Energex Milton Substation			Secondary System Changes at remote end for 2x 132kV feeders - supply of relays only
Telecommunications			Minor Telecommunications Changes
Underground Rock Allowance			
Wet Weather Allowance			
Design Coordination			
Project Management			
Qleave			
Other Costs			Project Concept/ Investment & Plan /Operations & Net Ops
<b>TOTAL QUOTE (EXCL RISKS AND OFFSETS)</b>	<b>11,390,098</b>	<b>12,862,073</b>	
<b>Offsets Estimate</b>	<b>0</b>	<b>0</b>	
<b>TOTAL QUOTE (INCL OFFSETS)</b>	<b>11,390,098</b>	<b>12,862,073</b>	
Climate			
Construction			
Design			
<b>Risk Estimate</b>			
<b>TOTAL QUOTE (INCL RISKS AND OFFSETS)</b>	<b>12,110,098</b>	<b>13,582,073</b>	

### 5.2 Asset Disposal Table

#### CP.02355 Asset Disposal. Values current at 30th June 2016

Functional Loc.	Description	Asset	Sub number	Book val.	% Disposal	Disposal Value	Currency
T030-D03-782-	782 FEEDER BAY	105720	0	46,670.72	80%	\$ 37,336.58	AUD
T030-D04-7257	7257 UPPER KEDRON 110kV FEEDER BAY	105722	0	46,670.72	80%	\$ 37,336.58	AUD
T030-D05-7256	7256 FEEDER BAY	105724	0	57,710.22	80%	\$ 46,168.18	AUD
T030-D06-781-	781 FEEDER BAY	105726	0	46,670.72	80%	\$ 37,336.58	AUD



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T030-D08-412-	110kV 2-3 BUS SECTION BAY	1057 30	0	44,766.26	80%	\$ 35,813.01	AUD
T030-D09-443-	110kV 3 TRANSF BAY	1057 32	0	848,801.65	70%	\$ 594,161.16	AUD
T030-SIN	SUBSTATION INFRASTRUCTURE	1057 41	0	407,317.63	10%	\$ 40,731.76	AUD
T030-SSS-7256	7256 FEEDER BAY	1057 23	0	217,048.69	100%	\$ 217,048.69	AUD
T030-SSS-7257	7257 UPPER KEDRON FEEDER BAY	1057 25	0	233,712.32	100%	\$ 233,712.32	AUD
T030-SSS-781-	781 FEEDER BAY	1086 59	0	94,733.48	100%	\$ 94,733.48	AUD
T030-SSS-782-	782 FEEDER BAY	1086 60	0	94,733.49	100%	\$ 94,733.49	AUD
T030-SSS-METR-REVMET4	FDR 782 ENERGY METERING (REVENUE)	1081 70	0	10,039.13	100%	\$ 10,039.13	AUD
T030-SSS-METR-REVMET5	FDR 781 ENERGY METERING (REVENUE)	1081 71	0	10,053.14	100%	\$ 10,053.14	AUD
T030-SSS-NBAY	NON BAY	1086 61	0	517,617.35	30%	\$ 155,285.21	AUD
<b>Total</b>						<b>\$ 1,644,489.29</b>	<b>AUD</b>



## 6. References

Document name and hyperlink (as entered into Objective)	Version	Date
<a href="#">Project Scope Report</a>	1	4/09/15
<a href="#">Estimate Detail</a>	1	18/09/15