

2018-22

POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.01710
Gin Gin Substation Rebuild

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ID&TS – Reset 2017/18-2021/22 Project Proposal for CP.01710 Gin Gin Substation Rebuild

Document Approval

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1. Executive Summary

Initial development of H006 Gin Gin substation occurred in 1971 as a 275/132kV bulk supply point between central and southern Queensland and to supply the northern wide bay area.

The original 275 and 132kV outdoor primary plant equipment is in poor condition and requires a major replacement. Items such as circuit breakers and instrument transformers are nearing the end of service life, with respect to maintenance support and reliability issues.

While the primary equipment requires replacement, the secondary systems were replaced in 2012 and the two transformers (excluding the associated HV switchgear) have recently been replaced. As a result the primary plant replacement works must be carried out in situ and interfaced to the existing secondary systems and transformer locations.

The objective of this project is to replace the selected primary plant within the 275 & 132 kV switchyards at H006 Gin Gin substation by 31 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 replacement of selected primary plant located within the 275 & 132kV switchyards at H006 Gin Gin substation to align with the reduced substation configuration requirement.

2.1.1 Transmission Line Works

Design, procure, construct and commission 275kV transmission line works to affect a bypass of Gin Gin Substation, by the joining of feeders F813 to Calliope River and F815 to Woolooga via two new 275kV transmission poles located outside the substation but within the existing easements.

2.1.2 H006 Gin Gin Substation Works

275kV Substation Works

Design, procure, construct and commission selected primary plant replacement of the 275kV switchyard resulting in a reduced configuration per Project Diagram 1 details as follows.

- Replace selected primary plant including, circuit breakers, isolators and instrument transformers including supporting structures and their foundations for the following bays:
 - =C02-A10 – 275kV feeder 814 to Calliope River;
 - =C02-A30 – 275kV coupler bay;
 - =C02-A20 – 275kV feeder 816 to Woolooga;
 - =C04-A10 – 275kV feeder 819 to Wurdong;

- =C04-A30 – 275kV coupler bay;
- =C04-A20 – 275kV feeder 826 to Teebar Creek;
- Note:** recover the existing line VT which was installed in 2013.
- =C05-A10 – 275kV Transformer 1 bay; and
- =C05-A20 – 275kV Transformer 2 bay.
- Replace the 275kV Bus CVTs, =KC1 & =KC2.
- Decommission and recover the existing 275kV line traps.
- Modify the existing secondary systems to interface with the new primary plant.
- Review and replace where necessary the busbar and landing span structures and foundations.
- Replace the switchyard lighting to current Powerlink standard.
- Review and upgrade substation lightning protection as necessary.
- Upgrade substation fence earthing to current Powerlink standard.
- Decommission and recover all redundant equipment, including;
 - =C01-A10 – 275kV feeder 815 to Calliope River;
 - =C01-A30 – 275kV coupler bay;
 - =C01-A20 – 275kV feeder 813 to Woolooga;
- Update drawing records, SAP records, configuration files, etc. accordingly.

132kV Substation Works

Design, procure, construct and commission selected primary plant replacement of the 132kV switchyard per Project Diagram 1, details as follows.

- Replace all primary plant including, circuit breakers, isolators and instrument transformers for the following bays:
 - =D2-132kV Transformer 1 bay;
 - Note:** retain the existing gapped surge arrestors and CVT.
 - =D3 - 132kV Feeder 7188/1 to Korenan Tee Granite Creek (Ergon);
 - =D6.1 - 132kV Feeder 7187 to Bundaberg (Ergon);
 - =D7 - 132kV Transformer 2 bay; and



- =D4 - 132kV Feeder 786 to Bundaberg (Ergon).
- =D5 - Replace all primary plant including isolators and instrument transformers in the bus section bay and install a new circuit breaker and associated secondary systems.
- =D04 - Decommission and recover the existing line trap.
- Modify the existing secondary systems to interface with the new primary plant.
- Review and replace where necessary the busbar and landing span structures and foundations.
- Replace the switchyard lighting to current Powerlink standard.
- Upgrade substation fence earthing to current Powerlink standard.
- Decommission and recover all redundant equipment.
- Update drawing records, SAP records, configuration files, etc. accordingly.

2.1.3 H005 Woolooga Substation Works

- Modify protection, control, automation and communications systems associated with the bypass of feeder F815 around H006 Gin Gin Substation, connecting to H067 Calliope River Substation.
- Update drawing records, SAP records, configuration files, etc. accordingly.

2.1.4 H067 Calliope River Substation Works

- Modify protection, control, automation and communications systems associated with the bypass of feeder F813 around H006 Gin Gin Substation, connecting to H005 Woolooga Substation.
- Update drawing records, SAP records, configuration files, etc. accordingly.



Bays redundant, plant and equipment to be recovered.

Bays replaced with new primary plant.

New Bus Section bay

Bays not affected

[Project Diagram 1](#)



2.2 Major Scope Assumptions

The condition of the 275Kv strain towers has been assessed and will not be replaced as part of this proposal.

Powerlink's live substation crew will be available to replace the bus disconnectors in the 132kV switchyard and to establish the new 132kV bus section bay. No site investigation has been carried out by this team to date.

2.3 Scope Exclusions

The plant and equipment below has been excluded from this scope due to its age and condition assessment.

- 1 Transformer
- 2 Transformer
- 2 Capacitor Bank
- 3 Capacitor Bank
- F7188/1 Feeder bay

3. Project Execution

3.1 Project Dependencies & Interactions

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
	None		
Co-requisite Projects			
	None		
Other Related Projects			
	None		

3.2 Site Specific Issues

H06 Gin Gin 132kV switchyard is compact and has very restricted access to most bays.

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.



Project Delivery Strategy Matrix

Design	Earthworks Design	N/A
	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	SPA Contractor
	Electrical Construction / Installation	SPA Contractor
	Transmission Line Construction	SPA Contractor
Testing	Substation Testing – FAT	SPA Contractor
	Substation Testing – SAT	SPA Contractor/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 1st October 2017.

High Level Schedule

- Project Approval : 1st October 2017
- Design Complete : March 2018
- SPA Construct contract awarded : May 2018
- Staged bay construction : June 2018 – August 2019
- Staged bay test/commissioning : July 2018 – Sept 2019
- Final decommissioning/Tidy up : October 2019
- Project Completion : 31st October 2019

3.4.2 Project Staging

Major project stages of the project are considered to be:

Stage	Description/Tasks
1	SPA contractor to construct two new 275kV transmission poles and string to ground anchor points. MSP to isolate and decommission C01 F813 and F815 feeder bays and 5012 bus coupler bay SPA contractor to cut over feeders F813 and F815 to the new bypass arrangement. SPA contractor to recover all primary plant and equipment in Bay C01 MSP to modify the remote end settings, renaming and commission feeder.
2	MSP to isolate and decommission F816 feeder bay and 5022 coupler bay. SPA Contractor to recover all primary plant and equipment SPA Contractor to construct new foundations and install new primary plant for F816 feeder bay and 5022 coupler bay. MSP to test and commission new F816 feeder bay and 5022 coupler bay.
3	MSP to isolate and decommission F814 feeder bay SPA Contractor to recover all primary plant and equipment SPA Contractor to construct new foundations and install new primary plant for F814 feeder bay. MSP to test and commission new F814 feeder bay.
4	MSP to isolate and decommission F826 feeder bay and 5042 coupler bay. SPA Contractor to recover all primary plant and equipment SPA Contractor to construct new foundations and install new primary plant for F826 feeder bay and 5042 coupler bay. MSP to test and commission new F826 feeder bay and 5042 coupler bay.
5	MSP to isolate and decommission F819 feeder bay SPA Contractor to recover all primary plant and equipment SPA Contractor to construct new foundations and install new primary plant for F819 feeder bay. MSP to test and commission new F819 feeder bay.
6	MSP to isolate and decommission 2 Bus including disconnectors 8163, 8263 and 5423 SPA contractor to replace 2 Bus including disconnectors 8163, 8263 and 5423 and 2 Bus CVT 9VT on new foundations and structures. MSP to test and commission 2 Bus including disconnectors 8163, 8263 and 5423



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7	MSP to isolate and decommission 1 Bus including disconnectors 5833, 8143, 8193, and 5413 SPA contractor to replace 1 Bus including disconnectors 5833, 8143, 8193, and 5413 and on new foundations and structures. MSP to test and commission 1 Bus including disconnectors 5833, 8143, 8193, and 5413.
8	MSP to isolate and decommission 1 transformer 275kV bay 5412 and 132kV bay 4412. SPA Contractor to recover all primary plant and equipment. SPA Contractor to construct new foundations and install new primary plant for 1 transformer 275kV and 132kV bays. MSP to test and commission 1 transformer primary plant.
9	MSP to isolate and decommission 2 transformer 275kV bay 5422 and 132kV bay 4422. SPA Contractor to recover all primary plant and equipment. SPA Contractor to construct new foundations and install new primary plant for 2 transformer 275kV and 132kV bays. MSP to test and commission 2 transformer primary plant.
10	MSP to isolate and decommission 132kV feeder bay F7187. SPA Contractor to recover all primary plant and equipment. SPA Contractor to construct new foundations and install new primary plant 132kV feeder bay F7187. MSP to test and commission 132kV feeder bay F7187 primary plant.
11	MSP to isolate and decommission 132kV feeder bay F786. SPA Contractor to recover all primary plant and equipment. SPA Contractor to construct new foundations and install new primary plant 132kV feeder bay F786. MSP to test and commission 132kV feeder bay F786 primary plant.
12	MSP to isolate and decommission 132kV feeder bay F7188. SPA Contractor to recover all primary plant and equipment. SPA Contractor to construct new foundations and install new primary plant 132kV feeder bay F7188. MSP to test and commission 132kV feeder bay F7188 primary plant.
13	MSP LIVE Substation Crew to replace insitu 132kV 1 bus and 2 bus disconnector's 4413, 71883, 7863, 4117, 4118, 4823, 71873 and 4423. Each bay will be de-loaded and isolated in turn to facilitate the live substation crew working on a live bus. MSP to test and commission 132kV 1 bus and 2 bus disconnector's 4413, 71883, 7863, 4117, 4118, 4823, 71873 and 4423
14	SPA contractor to construct the new circuit breaker foundation under the live bus. SPA contractor to erect the new bus section circuit breaker adjacent to the new foundation but outside exclusion zone distance from the bus and complete all associated secondary systems in bay D05 on extended cabling. MSP to test and commission the new circuit breaker in the temporary location. MSP LIVE Substation Crew to open disconnectors 4117 and 4118 and remove the solid section of bus between disconnectors 4117 and 4118. The new circuit breaker can now be lifted into position onto the new foundation. MSP LIVE substation crew to complete the connection of primary conductors between 4117 and 4118 and the new circuit breaker. MSP to complete the final test and commissioning of bay D05.
15	SPA contractor to replace switchyard lighting SPA contractor to upgrade the substation security fence earthing SPA contractor to recover all redundant equipment.

3.4.3 Network Impacts and Outage Planning

Preliminary outage advice from Network Operations has indicated that outages will be available for in situ replacement of feeder bays one at a time however bus outages will be very difficult to obtain and are likely to require live line work.



The transformer bays will only be available outside of the high load period of October to March.

Bus outages in the 132kV switchyard will be very difficult to obtain as it would involve multiple feeder outages. In order to overcome this issue the estimate is based on live substation crews being used to replace bus disconnectors and to establish the new bus section bay.

It is not anticipated that Grid Support will be required. However there are potential impacts on customer and Ergon load/security and more detailed analysis will be required at the project proposal phase.

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.

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.01710 - Gin Gin Substation Rebuild is as follows:

CP.01710 Quotation in \$ AUD	Base Levels	Escalated to Complin.	Comment (Costs @ Base Levels)
Line Works	██████	██████	Join existing feeders 813 and 815 to bypass Gin Gin Substation.
H006 Gin Gin 275kV Works	██████	██████	Replace 2 x 3CB Diameters including 4 x feeders, 2 x couplers + 2 x transformer bays with new deadtank bays. Decommission and recover eisting bays plus diameter for feeder 813 & 815. New Busbar
H006 Gin Gin 132kV Works	██████	██████	Replace 3x feeder bays, 2 x transformer bays with new deadtank bays. Provide new deadtank bus coupler bay to replace bus section. Live substation work for bus coupler and isolator work.
Telecommunications	██████	██████	Minor Telecommunications Changes
Wet Weather Allowance	██████	██████	
Design Coordination	██████	██████	
Project Management	██████	██████	
Qleave	██████	██████	
Other Costs	██████	██████	Project Concept/ Investment & Plan /Operations & Net Ops
TOTAL QUOTE (EXCL RISKS AND OFFSETS)	23,684,758	26,680,669	
Offsets Estimate	0	0	
TOTAL QUOTE (INCL OFFSETS)	23,684,758	26,680,669	
Climate	██████	██████	
Construction	██████	██████	
Design	██████	██████	
Risk Estimate	██████	██████	
TOTAL QUOTE (INCL RISKS AND OFFSETS)	25,104,758	28,100,669	



5.2 Asset Disposal Table

The current net book values of assets to be disposed of as a result of this project are set out in the table below.

CP.01710 Asset Disposal Value. Values current at 30th June 2016							
Functional Loc.	Description	Asset	Subnumbe	Book val.	Disposal %	Disposal Value	Currency
H006-C01-501-	275kv 1 COUPLER BAY	104585	0	75,709.16	100%	\$ 75,709.16	AUD
H006-C01-813-	813 FEEDER BAY	104586	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C01-815-	815 CALLIOPE RIVER BAY	104587	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C02-502-	275kv 2 COUPLER BAY	104591	0	75,709.16	100%	\$ 75,709.16	AUD
H006-C02-814-	814 FEEDER BAY	104592	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C02-816-	816 FEEDER BAY	104593	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C04-504-	275kv 4 COUPLER BAY	104597	0	75,709.16	100%	\$ 75,709.16	AUD
H006-C04-819-	819 FEEDER BAY	104598	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C04-826-	826 FEEDER BAY	104599	0	111,445.10	100%	\$ 111,445.10	AUD
H006-C05-541-	275kv 1 TRANSF BAY	104603	0	514,364.40	100%	\$ 514,364.40	AUD
H006-C05-542-	275kv 2 TRANSF BAY	104604	0	1,825,011.21	100%	\$ 1,825,011.21	AUD
H006-D02-441-	132kv 1 TRANSF BAY	104609	0	237,817.88	100%	\$ 237,817.88	AUD
H006-D03-7188	7188 FEEDER BAY	104611	0	517,918.11	100%	\$ 517,918.11	AUD
H006-D04-786-	786 FEEDER BAY	104613	0	211,563.48	100%	\$ 211,563.48	AUD
H006-D05-411-	132kv 1-2 BUS SECTION BAY	104615	0	57,277.39	100%	\$ 57,277.39	AUD
H006-D06-7187	7187 FEEDER BAY	104618	0	197,377.46	100%	\$ 197,377.46	AUD
H006-D07-442-	132kv 2 TRANSF BAY	104621	0	193,335.59	100%	\$ 193,335.59	AUD
H006-SIN	SITE INFRASTRUCTURE	104634	0	268,488.99	100%	\$ 268,488.99	AUD
Total						\$ 4,918,952.59	AUD



6. References

Document name and hyperlink (as entered into Objective)	Version	Date
Project Scope Report	1	04/09/2015
Estimate Detail	1	24/09/2015