2018-22
POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.02350
Bouldercombe Primary Plant Replacement

Delivering better value

ID&TS - Reset 2017/18-2021/22 Project Proposal for CP.02350 H010 Bouldercombe Primary Plant Replacement

Document Approval		
	Name	Position
Prepared by		Project Manager
Reviewed by		Manager Projects
Approved by		Group Manager Infrastructure Delivery

Contents

1. Executive Summary

H010 Bouldercombe substation was first established in 1975 to service the SQ-CQ 275kV interconnection between the major load centre of Brisbane in South East Queensland and Central Queensland generation points of Gladstone Stanwell and Callide. The site also provides 132kV injection into the Southern Central Queensland region owned and operated by Ergon Energy.

The objective of this project is to replace selected 275kV & 132kV primary plant 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 has been developed with reference to the Project Scope Report.

Briefly, the project consists of selected replacement of 275kV and 132kV primary plant and equipment at H010 Bouldercombe Substation.

2.1.1 Transmission Line Works

In accordance with circuit breaker schedule change landing spans for the following diameters/feeders:

- F848 move from =C05 to =C06
- F849 move from =C04 to =C05
- F820 move from =C03 to =C04
- F821 move from =C02 to =C03

2.1.2 H010 Bouldercombe Substation Works

Design, procure, construct and commission new 275kV primary plant to replace existing equipment with Powerlink's standard 275kV Dead Tank circuit breakers and shuffle line entries to suit:

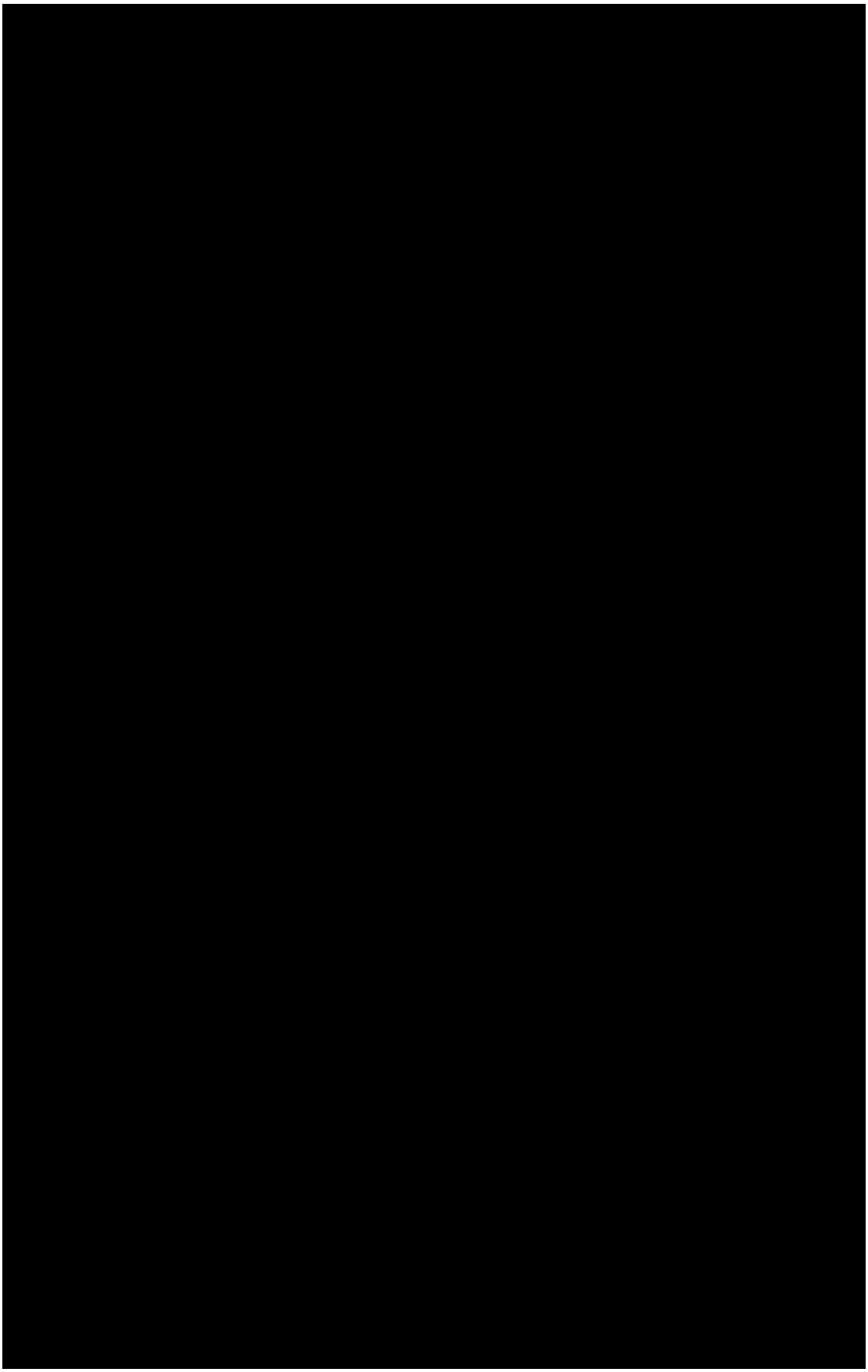
- Complete the 275kV diameter =C06 by establishing a new 275kV feeder circuit breaker bay for F848 being relocated under this project;
- Replace 275kV feeder bay (including VT's) F821 in bay =C03;
- Replace 275kV feeder bay (including VT's) F811;
- Replace existing 275kV bays in diameter =C05, F848, CB5052 & F812;
- Replace existing 275kV transformer bay for Transformer 2;

- Recover and dispose of all recovered switchgear including circuit breaker, isolators, earth switches, hardware and fittings, instrument transformers, structures foundations and supports;

Design, procure, construct and commission new 132kV primary plant to replace existing equipment with Powerlink's standard 132kV Dead Tank circuit breakers:

- Review and Replace all 132kV busbars(excludes new Bus 3 and Bus 4 sections);
- Replace 132kV feeder F7107 Circuit Breaker;
- Replace 132kV feeder F7108 Circuit Breaker;
- Replace 132kV feeder F7221 Circuit Breaker;
- Replace 132kV feeder F7170 Circuit Breaker;
- Replace 132kV feeder F7115 Circuit Breaker;
- Replace 132kV feeder F7167 Circuit Breaker;
- Replace 132kV transformer bay Transformer 1 (4412) including circuit breaker and bus isolators;
- Replace 132kV transformer bay Transformer 2 (4422) including circuit breaker and bus isolators;
- Replace bus coupler 4012 bay (4012) including circuit breaker and bus isolators;
- Decommission 132kV bus 1-3 Isolator and bridge through with busbar;
- Decommission 132kV bus 2–4 isolator and bridge through with busbar;

Decommission and recover all redundant equipment, and update drawing records, SAP records, config files, etc. accordingly.



2.2 Major Scope Assumptions

- No modifications are required after the bay rebuild (other than protection setting changes) to old feeder bay F848 prior to relocating F849 into this bay
- No modifications are required (other than protection setting changes) to old feeder bay F849 prior to relocating F820 into this bay
- No modifications are required after the bay rebuild (other than protection setting changes) to old feeder bay F820 prior to relocating F821 into this bay
- No modifications are required to diameter C02 (other than protection setting changes) as old feeder bay F821 will become an empty spare bay when F821 is relocated.
- The existing earth grid is suitable for reuse and will not be upgraded as part of this project

2.3 Scope Exclusions

- Replacement of busbar for Bus 3 and Bus 4 is excluded from the scope of work.
- Modifications or upgrade of F821 bay in diameter C02 when F821 is relocated.

3. Project Execution

3.1 Project Dependencies & Interactions

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
Co-requisite Projects			
Other Related Projects			
CP.02371	Bouldercombe Transformer 1 & 2 Replacement	June 2022	Based on current timing these projects do not overlap. There may be some savings by aligning the timing of the CP.02350 TF2 bay primary plant replacement with the CP.02371 TF2 replacement.

3.2 Site Specific Issues

None identified.

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	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	SPA Contractor
	Civil Construction	SPA Contractor
	Electrical Construction / Installation	SPA Contractor
	Transmission Line Construction	MSP
Testing	Substation Testing – FAT	SPA Contractor
	Substation Testing – SAT	Ergon Energy
	Substation Testing – Cut-Over	Ergon Energy
	Telecommunication Testing	Ergon Energy

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 2016.

High Level Schedule

- Project Approval : Oct 2016
- Design Complete : Jan 2017
- SPA Construct contract awarded : Feb 2017
- Staged bay construction : March 2017 – August 2019
- Staged bay test/commissioning : June 2017 – 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
275kV Switchyard	
Stage 1	MSP to carry out all required isolations to existing 275kV Bay between CB 5062 and 2 Bus in Diameter =C06. SPA Contractor to construct new 275kV Feeder CB Bay for F848 in C06 including all associated civil and electrical works as per design. MSP to carry out all required isolations to existing 275kV Feeder Bay F848 and divert feeder F848 into spare feeder bay in C06 creating spare bay C05 MSP to Commission F848 in C06.
Stage 2	MSP to carry out all required isolations to spare feeder bay C05 SPA Contractor to construct new 275kV Feeder CB Bay for F849 in C05 including all associated civil and electrical works as per design. MSP to carry out all required isolations to existing 275kV Feeder Bay F849 and divert feeder F849 into spare feeder bay in C05 creating spare feeder bay in C04. Commission F849 in C05.
Stage 3	MSP to carry out all required isolations to existing 275kV Feeder Bay F820 and divert feeder F820 into C04 creating spare feeder bay in C03. Commission F820 in C04.
Stage 4	MSP to carry out all required isolations to spare feeder bay C03 SPA Contractor to construct new 275kV Feeder CB Bay for F821 in C03 including all associated civil and electrical works as per design. MSP to carry out all required isolations to existing 275kV Feeder Bay F821 and divert feeder F821 into spare feeder bay in C03 creating spare feeder bay in C02. Commission F821 in C03.
Stage 5	SPA Contractor to recover old F821 275kV circuit breaker from spare feeder bay in C02
Stage 6	MSP to carry out all required isolations to remaining C05 diameter SPA Contractor upgrades including all associated civil and electrical works as per design. MSP Commission remaining C05 diameter.

Stage 7	MSP to carry out all required isolations to existing 275kV Transformer 2 Bay. SPA Contractor to replace in situ 275kV Transformer 2 Bay including all associated civil and electrical works as per design. MSP Commission transformer 2 bay.
Stage 8	MSP to carry out all required isolations to existing 275kV Feeder Bay F811. SPA Contractor to replace in situ 275kV feeder bay F811 including all associated civil and electrical works as per design. MSP Commission 275kV Feeder Bay F811.
132kV Switchyard	
Stage 9	MSP to carry out all required isolations to existing 132kV F7115 Bay. SPA Contractor to replace in situ 132kV Feeder F7115 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7115.
Stage 10	MSP to carry out all required isolations to existing 132kV F7170 Bay. SPA Contractor to replace in situ 132kV Feeder F7170 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7170.
Stage 11	MSP to carry out all required isolations to existing 132kV F7167 Bay. SPA Contractor to replace in situ 132kV Feeder F7167 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7167.
Stage 12	MSP to carry out all required isolations to existing 132kV F7108 Bay. SPA Contractor to replace in situ 132kV Feeder F7108 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7108.
Stage 13	MSP to carry out all required isolations to existing 132kV F7221 Bay. SPA Contractor to replace in situ 132kV Feeder F7221 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7221.
Stage 14	MSP to carry out all required isolations to existing 132kV F7107 Bay. SPA Contractor to replace in situ 132kV Feeder F7107 Circuit Breaker including all associated civil and electrical works as per design. MSP Commission F7107.
Stage 15	MSP to carry out all required isolations to existing 132kV Transformer 1 Bay. SPA Contractor to replace in situ 132kV Transformer 1 Bay including all associated civil and electrical works as per design. MSP Commission Transformer 1 Bay.
Stage 16	MSP to carry out all required isolations to existing 132kV Transformer 2 Bay. SPA Contractor to replace in situ 132kV Transformer 2 Bay including all associated civil and electrical works as per design. MSP Commission Transformer 2 Bay.
Stage 17	MSP to carry out all required isolations to existing 132kV 1-2 Bus Coupler Bay. SPA Contractor to replace in situ 132kV 1-2 Bus Coupler Bay including all associated civil and electrical works as per design. MSP Commission 1-2 Bus Coupler Bay.
Stage 18	MSP to carry out all required isolations to existing 132kV 1 Bus & 132kV 3 Bus including Bus Coupler Isolator 4117. SPA Contractor to replace in situ 132kV 1 Bus and decommission Isolator 4117 including all associated civil and electrical works as per design. MSP Commission New 132kV Bus 1.
Stage 19	MSP to carry out all required isolations to existing 132kV 2 Bus & 132kV 4 Bus including Bus Coupler Isolator 4127. SPA Contractor to replace in situ 132kV 2 Bus & 132kV 4 Bus and

	decommission Bus Coupler Isolator 4127 including all associated civil and electrical works as per design. MSP Commission New 132kV Bus 2.
Stage 20	MSP to isolate all secondary systems and decommissioned plant as per design for all previous stages of works and hand over to SPA Contractor. SPA Contractor to remove and recover/dispose of all remaining decommissioned plant, equipment and cables including all associated civil and electrical works as per design.

3.4.3 Network Impacts and Outage Planning

Preliminary outage advice from Network Operations has indicated that outages will be available for a combination of in situ replacement and bay shuffling. Detailed contingency plans will be required and a Return To Service (RTS) greater than 30 minutes requires negotiation with Network Operations. Detailed outage plans will need to be submitted as early as practical and outage dates agreed at least 12 months in advance.

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

This is a brownfield replacement within the existing fence-line and 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 the 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.02350 Bouldercoumbe Primary Plant Replacement is as follows:

CP.02350 Quotation in $ AUD	Base Levels	Escalated to Compln.	Comment (Costs @ Base Levels)
Line Works	[redacted]	[redacted]	Modify Line entries for 4 x 275kV feeders.
H010 Bouldercombe 275kV Works	[redacted]	[redacted]	Replace substation primary plant with deadtanks including: 3 x Feeder bays, 1 x complete 3CB diameter, 1xTransformer Bay. Complete the 275kV diameter =C06 and provide new panel, Recover Old F821 bay. Secondary system cabling to new plant.
H010 Bouldercombe 132kV Works	[redacted]	[redacted]	Replace substation primary plant with deadtanks including: 6 x Feeder bays,2xTransformer Bay, 1 x bus coupler bay
Remote Substation Works	[redacted]	[redacted]	Secondary System Changes for at remote end for new Feeder Panel for F848 at Bouldercombe. Secondary systems cabling to new plant.
Wet Weather & Design Co-ord	[redacted]	[redacted]	Wet Weather Allowance and Design Coordination
Project Management	[redacted]	[redacted]	
Qleave	[redacted]	[redacted]	
Other Costs			
TOTAL QUOTE (EXCL RISKS AND OFFSETS)	**23,157,248**	**25,883,384**	
Offsets Estimate	**0**	**0**	
TOTAL QUOTE (INCL OFFSETS)	**23,157,248**	**25,883,384**	
Climate	[redacted]	[redacted]	Project delay due to Wet Weather
Construction	[redacted]	[redacted]	Unknown Site Soil Condition - buried cable. Staging & Contingency
Design	[redacted]	[redacted]	Secondary System Integration old & new- Drawing Issues
Risk Estimate	[redacted]	[redacted]	
TOTAL QUOTE (INCL RISKS AND OFFSETS)	**24,557,248**	**27,283,384**	

Please follow the link in the table in Section 6 References for the Estimate Detail.

5.2 Asset Disposal Table

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

CP.02350 Asset Write-off's. Values current at 30th June 2016

Functional Loc.	Description	Asset	Book val.	% Write-off	Total Write-off	Currency
H010-C02-821-	821 FEEDER BAY	104725	111,916.07	100%	111,916.07	AUD
H010-C03-811-	811 FEEDER BAY	104730	111,916.07	100%	111,916.07	AUD
H010-C03-820-	820 FEEDER BAY	104731	111,916.07	100%	111,916.07	AUD
H010-C04-542-	275kV 2 TRANSF BAY	104736	573,801.64	100%	573,801.64	AUD
H010-C05-505-	275kV 5 COUPLER BAY	104741	470,193.77	100%	470,193.77	AUD
H010-C05-812-	812 FEEDER BAY	104742	694,569.82	100%	694,569.82	AUD
H010-C05-848-	848 FEEDER BAY	104743	635,120.07	100%	635,120.07	AUD
H010-D01-401-	132kV 1-2 BUS COUPLER BAY	104747	44,865.56	100%	44,865.56	AUD
H010-D02-7167	7167 FEEDER BAY	104749	178,411.16	70%	124,887.81	AUD
H010-D03-441-	132kV 1 TRANSF BAY	104751	58,474.19	100%	58,474.19	AUD
H010-D05-7115	7115 FEEDER BAY	104754	91,630.12	70%	64,141.08	AUD
H010-D06-442-	132kV 2 TRANSF BAY	104756	58,474.19	100%	58,474.19	AUD
H010-D07-7170	7170 FEEDER BAY	104758	62,027.96	70%	43,419.57	AUD
H010-D08-7221	7221 FEEDER BAY	104760	419,748.94	70%	293,824.26	AUD
H010-D09-7108	7108 FEEDER BAY	104762	62,027.96	70%	43,419.57	AUD
H010-D10-411-	132kV 1-3 BUS SECTION BAY	104764	4,536.23	100%	4,536.23	AUD
H010-D10-412-	132kV 2-4 BUS SECTION BAY	104765	4,536.23	100%	4,536.23	AUD
H010-D11-7107	7107 FEEDER BAY	104766	62,027.96	70%	43,419.57	AUD
				Total	3,493,431.78	AUD

6. References

Document name and hyperlink (as entered into Objective)	Version	Date
Project Scope Report	2.0	July 2015
Estimate Detail	1.0	Aug 2015