2023-27
POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack – PUBLIC

CP.02512, CP.02513, CP.02514, CP.02822
OpsWAN Replacement

CP.02512-4, CP.02822 – OpsWAN Replacement

Project Status: Not Approved

1. Network Requirement

Powerlink's Operational Wide Area Network (OpsWAN) enables data communication between Powerlink's corporate head office, Business Continuity Site, remote substations and telecommunications sites. This network is critical to the operation of the HV network; supporting real time and business support services such HV network operation decision support and HV asset condition monitoring and maintenance.

Clauses 4.8.1.and 4.8.2 of the National Electricity Rules (NER) requires a Network Service Provider to inform AEMO of any circumstance that has the potential to adversely affect the secure operation of the power system. Powerlink must maintain a general situational awareness of its network and connected equipment to be able to comply with these requirements, and also maintain compliance with the Power System Security Guidelines more broadly.

The majority of legacy OpsWAN routers in the Powerlink network are now obsolete, exceeding their end of support date in 2016. Remaining equipment and current routing functionality will soon become obsolete following the replacement of Powerlink's Synchronous Digital Hierarchy (SDH) and IP/MPLS network with hybrid multiplexors (MPLS-TP). Following this change, a new solution for Internet Protocol (IP) routing will be required to deliver the functionality currently provided by OpsWAN routers and IP/MPLS. Irrespective of this change, the current OpsWAN vendor has advised the existing equipment would cease to be supported from 2022.

As the OpsWAN network is used to monitor and control devices critical to the operation of the high voltage network, exploitation of known obsolescence vulnerabilities could result in access and/or loss of sensitive data and information, as well as targeted efforts to disrupt the supply of the high voltage network. Powerlink therefore need to address this emerging risk to ensure ongoing compliance with clauses 4.8.1 and 4.8.2 of the NER.

2. Recommended Option

As this project is currently 'Not Approved'.

The current recommended option is to replace existing OpsWAN equipment with a solution that provides equivalent functionality and integrates with the new hybrid multiplexors. This program of works is planned for delivery in four stages:

- Stage 1- Replacement to suit 4 broad site types
- Stage 2- North Queensland Sites
- Stage 3- Central Queensland Regional Access Networks
- Stage 4- Southern Queensland Regional Access Networks

The following options were considered but not proposed:

- Do Nothing – rejected due to non-compliance with compliance obligations.

The recommended option will extend the asset life by 15 years[3].

3. Cost and Timing

The estimated cost to replace OpsWAN equipment and target commissioning date per stage is outlined in Table 1.

Table 1: Cost and timing of OpsWAN equipment

Stage	Estimated replacement cost	Target commissioning date
Stage 1	5.4m ($2019/20)[3]	June 2024[3]
Stage 2	19.8m ($2019/20)[5]	June 2026[5]
Stage 3	11.1m ($2019/20)[7]	June 2028[7]
Stage 4	16.3m ($2019/20)[9]	June 2030[9]

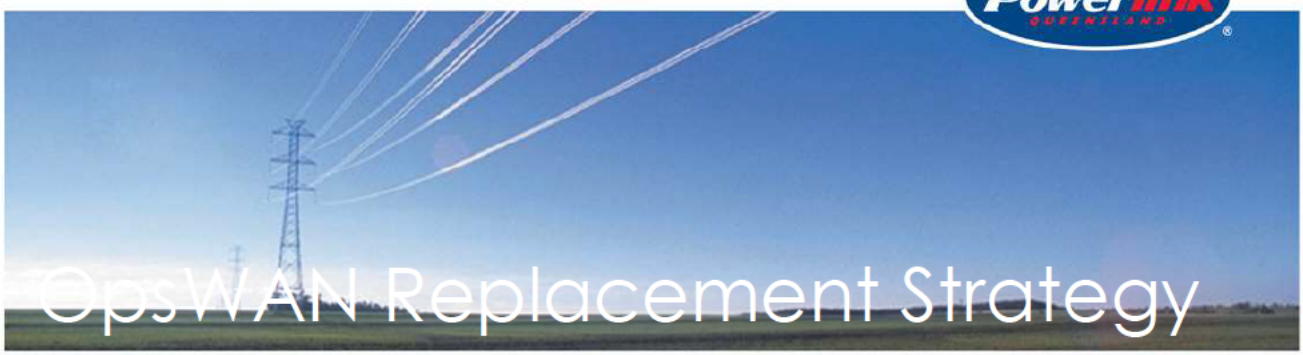
4. Documents in CP.02712-4, CP.02822 Project Pack

Public Documents

1. OpsWAN Replacement Strategy
2. Project Scope Report CP.02512 OpsWAN Replacement Stage 1
3. Concept Estimate for CP.02512 - OpsWAN Replacement Stage 1
4. Project Scope Report CP.02513 OpsWAN Replacement Stage 2
5. Concept Estimate for CP.02513 - OpsWAN Replacement Stage 2
6. Project Scope Report CP.02514 OpsWAN Replacement Stage 3
7. Concept Estimate for CP.02514 - OpsWAN Replacement Stage 3
8. Project Scope Report CP.02822 OpsWAN Replacement Stage 4
9. Concept Estimate for CP.02822 - OpsWAN Replacement Stage 4

Supporting Documents

10. Asset Reinvestment Criteria - Framework
11. Asset Management Plan 2021



OpsWAN Replacement Strategy

Division responsible:	Author:
Strategy & Business Development	[redacted]

Contents

Introduction 3
National Electricity Rules Obligations 3
Current state 4
Future state 5
Implementation and timing 6

Introduction

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the Business Continuity Site, remote substations and telecommunications sites. This data network is used to support a wide range of real time and business support services such as operational remote access and interrogation, high voltage (HV) network power system monitoring, phasor measurement, asset condition and security monitoring, corporate services, and provisions routing functionality for IP services including supervisory control and data acquisition (SCADA), metering and Voice over IP (VoIP) services. As such it is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed as part of projects to upgrade or replace substation secondary systems and as such has varied architecture dependant on the design standards in place at that particular time.

This has resulted in a variety of Local Area Network (LAN) architectures and equipment. Whilst the majority of switches in the LAN have been replaced over time, the devices that perform the routing functionality are no longer available for purchase and are either beyond manufacturer support or in a support mode.

This document outlines the strategy for the replacement of the core OpsWAN devices to meet operational services requirements in the medium to long term.

National Electricity Rules Obligations

The National Electricity Rules (Rules) requires a Network Service Provider to inform AEMO of any circumstance that has the potential to adversely affect the secure operation of the power system. Specifically, clause 4.8.1 states that:

> *"A Registered Participant must promptly advise AEMO or a relevant System Operator at the time that the Registered Participant becomes aware, of any circumstance which could be expected to adversely affect the secure operation of the power system or any equipment owned or under the control of the Registered Participant or a Network Service Provider."*

Similarly, clause 4.8.2(a) states that:

> *"If a Registered Participant becomes aware that any relevant protection system or control system is defective or unavailable for service, that Registered Participant must advise AEMO."*

Both clauses are classified as a civil penalty provision. It is therefore incumbent upon Powerlink to maintain a general situational awareness of its network and connected equipment to be able to comply with these requirements, and also maintain compliance with the Power System Security Guidelines more broadly.

Current state

Powerlink's Digital Asset Management Framework highlights four distinct change vectors that must be considered and monitored during the asset life cycle in order to perform prudent asset management of digital assets. One of these change vectors is obsolescence. From the Digital Asset Management Framework:

> *"Obsolescence is the inability to support a product, system, or service for ongoing use despite it being in reasonable working order. While life extension is possible, an unsupported product has a significantly increased risk profile as a lack of spares and expertise increase the consequences of failure. Additionally lack of cyber security mitigations also increases both likelihood and consequences of risks associated with legacy digital assets. Obsolescence differs in its asset management treatment in that it is typically addressed via a 'fleet-wide' replacement decision where the organisation will strategically divest all instances, rather than targeted at individual assets."*

Obsolescence is typically defined by vendors as the last date to receive service and support for the product, including patches for firmware faults or security vulnerabilities. Hence, legacy OpsWAN routers will over time become increasingly susceptible to malfunction and the potential exploitation of known security vulnerabilities.

The majority of legacy OpsWAN routers are now obsolete, exceeding their end of support date of 2016. These are being maintained by the refurbishment of recovered units and replacement with modern equivalent devices where available. However, this is not a feasible solution in the medium term due to lack of like-for-like replacements with an increase in risk for the potential exploitation of known security vulnerabilities and potential fleet wide impacts of unpatched firmware faults.

As the OpsWAN network is used to monitor and control devices critical for the operation of the high voltage network, exploitation of a known vulnerability could result in the access and/or loss of sensitive data and information, as well as targeted efforts to disrupt the supply of the high voltage network. The likelihood of the risk is minimised due to the routers not being internet facing. However, this does not mitigate against physical access to the routers, or a misconfiguration with the corporate and operational firewall and/or intrusion prevention systems.

Replacement of obsolete and obsolescent OpsWAN routers and associated equipment has commenced where Multiprotocol Label Switching (MPLS) is already established at a site and the work coincides with a planned secondary systems replacement project. This approach was to be extended by rolling out a scalable MPLS installation at all sites to replace the OpsWAN router functionality.

However announcements by Huawei, the current vendor, advised that the supportability and manufacture of the equipment used by Powerlink in the telecommunication network would cease to be manufactured and supported sooner than originally expected with support for some equipment ending as shown in the table below.

Network Equipment	Product Type / Platform	Versions	Hardware End Of Manufacture	Hardware End Of Support
[redacted]	Router	[redacted]	Passed	31/12/24
[redacted]	Router	[redacted]	Passed	30/06/25
[redacted]	Router	[redacted]	30/06/22	30/06/27
[redacted]	Network Management System	[redacted]	Passed	31/12/23
[redacted]	DWDM	[redacted]	Passed	30/06/22
[redacted]	SDH	[redacted]	Passed	31/12/24
[redacted]	SDH	[redacted]	Passed	31/12/24
[redacted]	SDH	[redacted]	Passed	31/12/25
[redacted]	SDH	[redacted]	Passed	31/12/24
[redacted]	SDH	[redacted]	Passed	30/06/26

The announcement by Huawei covered telecommunication platforms of Synchronous Digital Hierarchy (SDH), Dense Wavelength Division Multiplexing (DWDM) and MPLS, which has impacted the strategy outlined above.

Whilst this forces earlier obsolescence than anticipated, the common dates provide Powerlink the opportunity to take a holistic view of the telecommunications network. As such two registrations of interest have been issued to the market for the replacement of the DWDM network and for a hybrid solution that will consolidate the Plesiochronous Digital Hierarchy (PDH) and SDH equipment and also provide Multiprotocol Label Switching - Transport Profile (MPLS-TP) data transport functionality.

Future state

Whilst hybrid multiplexors offer the advantage of both SDH and MPLS transport capabilities, allowing consolidation of the transport and access functionality, they do not offer native layer 3 routing capability. As such, this functionality will need to be provided as part of the OpsWAN replacement by a device capable of routing functionality required by the IP services.

The intent of the OPSWAN replacement projects is to replace the existing Huawei MPLS routers and obsolete OPSWAN routers with a layer 3 capable device. Where possible some consolidation of core switch functionality within the substation will also be undertaken. Firewalls and servers will also be replaced and updated to the latest versions where required.

At a high level the interaction between the devices and networks is shown below.

This proposed high-level architecture is in alignment with and enables the strategy to perform a progressive migration of the PDH network onto the MPLS and SDH networks.

Implementation and timing

While the OpsWAN devices facilitate the routing of IP services at a substation, the transport of the services is reliant on the DWDM and SDH networks.

As such, it is intended that the detailed design of the OpsWAN replacement solution is developed in parallel with that of the telecommunications DWDM replacement and hybrid network consolidation projects across the state. This will ensure appropriate integration of the solutions proposed, to deliver the most cost effective overall solution.

The implementation of the OpsWAN replacement solution would be rolled out on a geographic basis, coordinated with and following the establishment of the DWDM and hybrid networks. This approach offers the most opportunity to extract efficiencies in delivery by minimising re-work and repeat site establishment of delivery resources.

Due to dependencies in network architecture design to facilitate operational services, any delay in these projects will have an impact on the delivery of the OpsWAN replacement projects.

Project Scope Report

CP.02512

OpsWAN Replacement Stage 1

Concept – Version 2

Document Control

Change Record

Issue Date	Responsible Person	Objective Document Name	Background
12/02/2016	[redacted]	Project Scope Report – CP.02512 SCADA and OpsWAN Rationalisation Stage 1.	Preliminary scope
16/09/2020	[redacted]	Project Scope Report – CP.02512 OpsWAN Sites Upgrade	Revised scope in line with revised strategy

Related Documents

Issue Date	Responsible Person	Objective Document Name
June 2020	[redacted]	OpsWAN Replacement Strategy

Project Contacts

Project Sponsor	[redacted]	[redacted]
Senior Telecommunications Strategies Engineer	[redacted]	[redacted]
Manager Operational Technology Services	[redacted]	[redacted]
Customer Account Manager (Ergon)	[redacted]	[redacted]
Program Manager	TBD	Ext.
Project Manager	TBD	Ext.

Project Details

1. Project Need

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the Business Continuity Services (BCS), remote substations and telecommunications sites. This data network is used to support a wide range of real time and business support services such as HV network operation decision Support, HV asset condition monitoring and maintenance and Corporate Services and as such is critical to the operation of the operation of the HV network.

The provision of the OpsWAN network has typically been deployed as part of substation refurbishments/Secondary Systems rebuilds and as such has varied in architecture dependent on the design standards in place at that particular time.

This has resulted in different Local Area Network (LAN) architectures and varying equipment and whilst the majority of switches in the LAN have been replaced over time the devices that perform the routing functionality are no longer available for purchase and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing it's soon to be obsolete Synchronous Digital Hierarchy (SDH) and IP/MPLS network with a hybrid multiplexor configured with SDH and Multiprotocol Label Switching - Transport Profile (MPLS-TP) which will provide the transmission function. With the introduction of MPLS-TP the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers by October 2023 and allow the eventual migration of all services to IP.

2. Project Drawing

Not Applicable.

3. Project Scope

3.1. Original 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 5 Matters to Consider*.

The project consists of required work to provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP.

OpsWAN routers will be decommissioned and services migrated to the new solution. OpsWAN will become a service over the network rather than a network in its own right.

It is also intended under this project to reduce the amount of equipment required within the substation where it is feasible to do so.

The project is to be provided in two deliverables.

3.2. Preliminary Works – Deliverable 1

Determine an architecture that will provide routing functionality at a substation that will allow all current and future IP based services to interface and be transported over a MPLS-TP/SDH transmission network.

The following is to be considered

- PE/CE functions should be combined into one device where practical;
- Cyber security (firewalls, intrusion prevention, etc.) and servers are to be taken into account and virtualised if possible;
- Supporting equipment required at Virginia and the BCS is also to be included;
- The telecommunications model is to updated accordingly;
- Architecture must provide for redundancy requirements of critical services, ie SCADA;
- OpsWAN is to be considered as a service over the network and whilst the OpsWAN routers will be removed the current underlying OpsWAN network within the substation is to remain as is, with;
- [redacted] switches are to be replaced;
- [redacted] switches are only to be replaced where it makes sense to do so;
- Servers earlier than GEN IV are to be replaced;
- Sites that have a single server and are being upgraded to dual PE/CE are to upgraded to dual new servers; and
- Determine write-off costs for any equipment identified to be decommissioned or replaced under Deliverable 2.

Review the market and current Powerlink equipment vendors for devices that will integrate and consolidate functionality to reduce the amount of equipment required.

If required, a functional specification is to be produced and the market engaged via the normal procurement / tender process. However this is not required if it is found that a viable option is to continue with current vendors

Engage Netcracker to deliver a proof of concept by modelling an existing substation OpsWAN network in the neXus DEV environment. The proof of concept should include

device modelling, straight line diagrams, OpsWAN connectivity and an IP register of the substation.

Determine if the outcome of the proof of concept can be used to replace the existing OpsWAN device register.

Determine level of training that is to be provided as part of Deliverable 2.

Document the new architecture standards to be deployed for OpsWAN.

Prepare and submit the project proposal for deployment of the new OpsWAN architecture and confirm the list of sites (Attachment 1) and associated functional locations for Deliverable 2.

3.3. Deployment – Deliverable 2

For the sites listed refer to Attachment 1:

- Install and configure the solution determined in Deliverable 1;
- Migrate “OpsWAN” to the new solution and decommission existing OpsWAN routers;
- Migrate any services that are provided by the [redacted] to the new system;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus if proof of concept was successful in deliverable 1. Any additional functionality deemed acceptable in the proof of concept in Deliverable 1 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

3.4. Variations to Scope (post project approval)

Not applicable

4. Project Timing

4.1. Site Access Date

Site Access Dates are not applicable for this project as the work will take place at existing Powerlink sites.

4.2. Commissioning Date

Preliminary works defined under Deliverable 1 are to be completed and a project proposal submitted by 31 March 2022 for full project approval.

The latest date for works under Deliverable 2 which covers the commissioning of the new assets included in this scope and the decommissioning and removal of redundant equipment, where applicable, is October 2023.

5. Matters to Consider

The following issues are important to consider during the implementation of this project:

- Those sites that currently have SIP installed are out of scope and will be addressed as part of the SDH/MPLS upgrade project. As this project will be run in parallel but not necessarily in conjunction with the SDH/MPLS-TP upgrade project design consideration must be given to the ultimate network architecture to aid in future cutover works.
- Any existing assets to be removed and disposed of as part of this scope must be identified within the estimate together with the forecast early asset write off amounts at time of disposal.
- Plant and equipment identified as suitable to be recovered for use as spares or returned to stores should be packaged and transported to an appropriate storage location, with a suitable allowance for the cost included in the estimate.
- A high level project implementation plan including staging and outage plans (as per Section 9) should be considered and produced as part of the estimate.

6. Asset Management Requirements

Equipment shall be in accordance with Powerlink equipment strategies and compatible with the existing technology in use. Asset Strategies are to be consulted via the Project Sponsor on all telecommunications strategies and current Powerlink standards.

Unless otherwise advised [redacted] will be the Project Sponsor for this project. The Project Sponsor must be included in any discussions with any other areas of Investment & Planning.

[redacted] will provide the primary customer interface with Ergon. The Project Sponsor should be kept informed of any discussions with such customers.

7. Asset Ownership

The works detailed in this project will be Powerlink Queensland assets. All assets created, including spare parts purchased, will be entered into SAP as regulated assets and depreciated accordingly.

8. System Operation Issues

Operational issues that should be considered as part of the scope and estimate include:

- interaction of project outage plan with other outage requirements;
- likely impact of project outages upon grid support arrangements; and
- likely impact of project outages upon the optical fibre network.

9. Options

Options will be considered during the Deliverable 1 phase before implementing the preferred option in Deliverable 2

10. Division of Responsibilities

Not Applicable.

11. Related Projects

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.02771	Telecommunication Network Consolidation Stage 1	Oct 2023	
CP.02269	DWDM Replacement	Dec 2022	
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	Oct 2024	
CP.02812	Telecommunication Network Consolidation Stage 3	Oct 2025	
CP.02813	Telecommunication Network Consolidation Stage 4	Oct 2026	
CP.02513	OpsWAN Replacement Stage 2	Oct 2024	
CP.02514	OpsWAN Replacement Stage 3	Oct 2025	
CP.02822	OpsWAN Replacement Stage 4	Oct 2026	

Attachment 1

Site	
S005	Western Downs
H052	Kogan Creek
H078	Orana
H077	Columboola
T216	Condabri North
T217	Condabri Central
T218	Condabri South
H076	Wandoan South
T219	Wolebee Creek
T224	Dinoun South
H079	Yuleba North
T225	Clifford Creek
H082	Blythedale
H080	Eurombah
H081	Fairview South
T227	Fairview

Concept Estimate for CP.02512 - OpsWAN Replacement Stage 1

Record ID	A3412583	
Policy stream	Asset Management	
Authored by	Project Manager	[redacted]
Reviewed by	Project Manager	[redacted]
Reviewed by	Team Leader	[redacted]
Approved by	Manager of Projects	[redacted]

Table of Contents

1. Executive Summary 4

1.1 Option 1 4

1.1.1 Project Estimate 4

1.1.2 Project Financial Year Cash Flows 4

1.2 Option 2 5

1.2.1 Project Estimate 5

1.2.2 Project Financial Year Cash Flows 5

2. Project and Site Specific Information 5

2.1 Project Dependencies & Interactions 6

2.2 Site Specific Issues 6

3. Option 1 – Partial Equipment replacement 6

3.1 Definition 6

3.1.1 Scope 6

3.1.1.1 Substations Works 8

3.1.1.2 Transmission Line Works 9

3.1.1.3 Telecommunication Works 9

3.1.1.4 Easement/Land Acquisition & Permit Works 9

3.1.2 Major Scope Assumptions 9

3.1.3 Scope Exclusions 10

3.2 Project Execution 10

3.2.1 Project Schedule 10

3.2.2 Network Impacts 10

3.2.3 Project Staging 10

3.2.4 Resourcing 10

3.3 Project Estimate 11

3.4 Project Financial Year Cash Flows 11

3.5 Project Asset Classification 11

4. Option 2 – Full Replacement 11

4.1 Definition 11

4.1.1 Scope 11

4.1.1.1 Substations Works 11

4.1.1.2 Transmission Line Works 11

4.1.1.3 Telecommunication Works 12

4.1.1.4 Easement/Land Acquisition & Permit Works 12

4.1.2 Major Scope Assumptions 12
4.1.3 Scope Exclusions 12
4.2 Project Execution *13*
4.2.1 Project Schedule 13
4.2.2 Network Impacts 13
4.2.3 Project Staging 13
4.2.4 Resourcing 13
4.3 Project Estimate *13*
4.4 Project Financial Year Cash Flows *14*
4.5 Project Asset Classification *14*
5. References 14

1. Executive Summary

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network is used to support a wide range of real time and business support services such as HV network operation decision Support, HV asset condition monitoring and maintenance and Corporate Services and as such is critical to the operation of the operation of the HV network.

The provision of the OpsWAN network has typically been deployed as part of substation refurbishments/Secondary Systems rebuilds and as such has varied in architecture dependent on the design standards in place at that particular time.

This has resulted in different LAN architectures and varying equipment and whilst the majority of switches in the LAN have been replaced over time the devices that perform the routing functionality are no longer available for purchase and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing it's soon to be obsolete SDH and IP/MPLS network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of MPLS-TP the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers by June 2024 and allow the eventual migration of all services to IP.

1.1 Option 1

1.1.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**5,366,762**	**5,780,287**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.1.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2021	56,105	56,105
To June 2022	1,464,960	1,525,023
To June 2023	3,133,369	3,395,572
To June 2024	712,328	803,587
TOTAL	**5,366,762**	**5,780,287**

1.2 Option 2

1.2.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**7,038,305**	**7,551,079**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.2.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2021	58,949	58,949
To June 2022	2,504,439	2,607,121
To June 2023	3,673,090	3,980,457
To June 2024	801,828	904,552
TOTAL	**7,038,305**	**7,551,079**

2. Project and Site Specific Information

The project is to be provided in two deliverables.

Deliverable 1-Preliminary works:

- Determine an architecture that will provide routing functionality at a substation that will allow all current and future IP based services to interface and be transported over a MPLS-TP/SDH transmission network.

Deliverable 2- Sited Deployment:

- Install and configure the solution determined in Deliverable 1;
- Migrate “OpsWAN” to the new solution and decommission existing OpsWAN routers;
- Migrate any services that are provided by the [redacted] to the new system;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus if proof of concept was successful in deliverable 1. Any additional functionality deemed acceptable in the proof of concept in Deliverable 1 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

2.1 Project Dependencies & Interactions

Two options were estimated for this project.

This project is dependent on the completion delivery of the following projects:

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.02771	Telecommunication Network Consolidation Stage 1	October 2023	Actual commission dates may differ in the future
CP.02269	DWDM Replacement	December 2022	Actual commission dates may differ in the future
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	October 2024	Actual commission dates may differ in the future
CP.02812	Telecommunication Network Consolidation Stage 3	October 2025	Actual commission dates may differ in the future
CP.02813	Telecommunication Network Consolidation Stage 4	October 2026	Actual commission dates may differ in the future
CP.02513	OpsWAN Replacement Stage 2	October 2024	Actual commission dates may differ in the future
CP.02514	OpsWAN Replacement Stage 3	October 2025	Actual commission dates may differ in the future
CP.02822	OpsWAN Replacement Stage 4	October 2026	Actual commission dates may differ in the future

2.2 Site Specific Issues

Not applicable.

3. Option 1 – Partial Equipment replacement

3.1 Definition

Partial replacement to suit 4 broad site types

3.1.1 Scope

Partial replacement to suit 4 broad site types as per following below.

Solution 1: Site type 1

- Sites where OpsWAN switches are older than the current [redacted] or a mix with older [redacted] switches.
- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2: Site type 2

- [redacted] is the sites core switches and all OpsWAN switches are the current [redacted].
- Only replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3: Site type 3

- All OpsWAN switches are the current [redacted].
- No Site core [redacted] switches on site.
- Existing [redacted] or no MPLS on site.
- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4: Site type 4

- Remote site (hut or repeater or single router/switch).
- Replace the existing device with one single [redacted] with switch blades.

3.1.1.1 Substations Works

Solution 1 - Scope of works:

- Install 2 x new combined PE/CE switches, 2 x servers and 8 x OpsWAN switches in existing panels.
- IP addresses to be reallocated across the site.

Solution 2 - Scope of works:

- Install 2 x new combined PE switches and 2 x servers in existing panels.
- [redacted] OpsWAN switches and CE switches to be retained.
- IP addresses changes not required.

Solution 3 -Scope of works:

- Install 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

Solution 4 -Scope of works:

- Install new combined single PE/CE switch and 1 x server in existing panel.
- IP addresses changes not required.

3.1.1.2 Transmission Line Works

Not applicable.

3.1.1.3 Telecommunication Works

Solution 1 - Scope of works:

- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2 - Scope of works:

- Replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3 -Scope of works:

- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4 -Scope of works:

- Replace the existing device with one single [redacted] with switch blades.

3.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable.

3.1.2 Major Scope Assumptions

Solution specific assumptions:

Solution 1:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers and 1 x building switch), 3 station panels (containing 2 x building switches in each panel) and one LAN panel (containing one building switch).
- Each site has 30 devices which need to have IP address changes.

Solution 2:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).

Solution 3:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).
- Each site has 30 devices which need to have IP address changes.

Solution 4:

- Each site has 1 SIP/MPLS panels (containing 1 x PE/CE, 1 x server).

The following assumptions are applicable to all four site type solutions:

- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- Skilled MSP resource will be available.
- No network outages required.

- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg. SVCs).
- Works associated with change request actions that require protection isolation (eg. relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.

3.2 Project Execution

3.2.1 Project Schedule

The duration of the project is 36 months. It is based on a start date of 30 June 2021 and final project commissioning date June 2024.

Stage	Description/Tasks
Project Approval, PAN Issued	June 2021
Phase 1 deliverable	June 2022
Procurement	June 2022 to April 2023
Telecoms Construction	April 2023 to June 2024
Project completion	June 2024

3.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will be no outages required for the execution of this project.

3.2.3 Project Staging

Stage	Description/Tasks
1	Design Guide development (Phase 1)
2	Bench testing (Phase 1)
3	Construction of Headend devices (Phase 2)
4	Site Implementation. (Phase 2)

3.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out.

3.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**5,366,762**	**5,780,287**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

3.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2021	56,105	56,105
To June 2022	1,464,960	1,525,023
To June 2023	3,133,369	3,395,572
To June 2024	712,328	803,587
TOTAL	**5,366,762**	**5,780,287**

3.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	2,953,493	55%
Communications	15 years	2,413,269	45%
TOTAL		**5,366,762**	

4. Option 2 – Full Replacement

4.1 Definition

4.1.1 Scope

Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.1 Substations Works

- Install 2 x Opswan switches per building, 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

4.1.1.2 Transmission Line Works

Not applicable.

4.1.1.3 Telecommunication Works

- Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable

4.1.2 Major Scope Assumptions

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers), 1 x station panel per building (containing 2 x building switches in each panel).
- Each site has 30 devices which need to have IP address changes.
- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- For the full replacement of field network devices, it is assumed that the labour costs associated with the field works would be within 5% variance to the cost of the partial replacement option.
- Skilled MSP resource will be available.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- No network outages required.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

4.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg: SVCs).
- Works associated with change request actions that require protection isolation (eg: relay IP changes).
- Changes to existing services that aren’t connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.
- Review the current management system is excluded from the scope of works.
- Engage external parties to duplicate the OpsWAN Device register.
- Engage external parties to model OpsWAN network.

4.2 Project Execution

4.2.1 Project Schedule

The duration of the project is 36 months. It is based on a start date of 30 June 2021 and final project commissioning date June 2024.

Item	Timing:
Project Approval, PAN Issued	June 2021
Phase 1 deliverable	June 2022
Procurement	June 2022 to April 2023
Telecoms Construction	April 2023 to June 2024
Project completion	June 2024

4.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will be no outages required for the execution of this project.

4.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Bench testing
3	Construction and commissioning

4.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out.

4.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**7,038,305**	**7,551,079**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

4.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2021	58,949	58,949
To June 2022	2,504,439	2,607,121
To June 2023	3,673,090	3,980,457
To June 2024	801,828	904,552
TOTAL	**7,038,305**	**7,551,079**

4.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	4,038,994	57%
Communications	15 years	2,999,311	43%
TOTAL		7,038,305	

5. References

Document name	Version	Date
Project Scope Report	2.0	16/09/2020

Project Scope Report

CP.02513

OpsWAN Replacement Stage 2

Concept – Version 1

Document Control

Change Record

Issue Date	Responsible Person	Objective Document Name	Background
20/07/2020	[redacted]	Project Scope Report CP.02513 OpsWAN Replacement Stage 2	PSR created

Related Documents

Issue Date	Responsible Person	Objective Document Name
June 2020	[redacted]	OpsWAN Replacement Strategy

Document Purpose

The purpose of this Project Scope Report is to define the business (functional) requirements that the project is intended to deliver. These functional requirements are subject to Powerlink's design and construction standards and prevailing asset strategies, which will be detailed in documentation produced during the detailed scoping and estimating undertaken by DTS (or OSD), i.e. it is not intended for this document to provide a detailed scope of works that is directly suitable for estimating.

Project Contacts

Project Sponsor	[redacted]	[redacted]
Connection & Development Manager	Tba	Ext.
Strategist – HV/Digital Asset Strategies	[redacted]	[redacted]
Grid Planner	tba	Ext.
Manager Projects	tba	Ext.
Project Manager	tba	Ext.
Design Coordinator	tba	Ext.

Project Details

1. Project Need & Objective

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different Local Area network (LAN) architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the Synchronous Digital Hierarchy (SDH) and Internet Protocol (IP)/Multiprotocol Label Switching (MPLS) network with a hybrid multiplexor configured with SDH and Multiprotocol Label Switching – Transport Profile (MPLS-TP) which will provide the transmission function. With the introduction of MPLS-TP, the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP by October 2024.

2. Project Drawing

Not applicable

3. Project Scope

3.1. Original 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 5 Special Considerations.

The scope of this project will provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP. OpsWAN routers will be decommissioned and services migrated to the new solution. OpsWAN will become a service over the network rather than a network in its own right.

As this project will be delivered in parallel but not necessarily in conjunction with the network consolidation projects, design shall consider the ultimate network architecture with a view to facilitating future cutover works where feasible. It is also intended, within the scope of this project, to reduce the amount of equipment required within the substation where it is feasible to do so.

Briefly, the project consists of the replacement of the OpsWan at the sites identified in Attachment 1.

3.2. Communications Deployment

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1 at the sites listed in Attachment 1. Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate “OpsWAN” to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where a POE switch is installed, IP telephone handsets are to be provided and OTN lines are to be delivered natively over the IP network;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

3.3. Key Scope Assumptions

The following assumptions should be included in the estimating of this scope:

- The solution will be developed within the scope of CP.02512. The scope of this project includes the deployment of the solution to the sites per Attachment 1.

- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.4. Variations to Scope (post project approval)

Not applicable.

4. Project Timing

4.1. Project Approval Date

The anticipated date by which the project will be approved is 30 June 2022.

4.2. Site Access Date

The scope of works is at existing Powerlink sites. As a result site access is already available.

4.3. Commissioning Date

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 31 October 2024.

5. Special Considerations

The following matters are important to consider during the implementation of this project:

- Any existing assets to be removed and disposed of as part of this scope must be identified within the estimate together with the forecast early asset write off amounts at time of disposal; and
- Plant and equipment identified as suitable to be recovered for use as spares or returned to stores should be packaged and transported to an appropriate storage location, with a suitable allowance for the cost included in the estimate.

6. Asset Management Requirements

Equipment shall be in accordance with Powerlink equipment strategies.

Unless otherwise advised [redacted] will be the Project Sponsor for this project. The Project Sponsor must be included in any discussions with any other areas of Strategy and Business Development.

Business Development will provide the primary customer interface as required. The Project Sponsor should be kept informed of any customer discussions.

7. Asset Ownership

The works detailed in this project will be Powerlink Queensland assets.

8. System Operation Issues

Operational issues that should be considered as part of the scope and estimate include:

- interaction of project outage plan with other outage requirements;
- likely impact of project outages upon grid support arrangements; and
- likely impact of project outages upon the optical fibre network.

9. Options

Not applicable

10. Division of Responsibilities

Not applicable

11. Related Projects

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.02512	OpsWAN Replacement Stage 1	Oct 2023	
CP.02771	Telecommunication Network Consolidation Stage 1	Dec 2023	
CP.02269	DWDM Replacement	Dec 2022	
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	Oct 2024	
CP.02812	Telecommunication Network Consolidation Stage 3	Oct 2025	
CP.02813	Telecommunication Network Consolidation Stage 4	Oct 2026	
CP.02514	OpsWAN Replacement Stage 3	Oct 2025	
CP.02822	OpsWAN Replacement Stage 4	Oct 2026	

Attachment 1

Sites to be considered are detailed below

- H011 NEBO SUBSTATION
- H013 ROSS SUBSTATION
- H032 CHALUMBIN SUBSTATION
- H035 STRATHMORE SUBSTATION
- H039 WOREE SUBSTATION
- H044 BAYVIEW HEIGHTS REPEATER
- H056 YABULU SOUTH SUBSTATION
- H060 WALKAMIN SUBSTATION
- H084 MT EMERALD WIND FARM
- H087 CRUSH CREEK SUBSTATION
- H091 HAUGHTON RIVER
- KMTR KELLY MOUNTAIN MICROWAVE REPEATER
- MFXR MT FOX FIBRE OPTIC REPEATER
- MSVR MT SEAVIEW (ERGON)
- MTBR MOUNT BLACKWOOD RADIO REPEATER
- SMHR SMITHS HILL (TELSTRA)
- T034 MORANBAH SUBSTATION
- T036 INVICTA SUGAR MILL SUBSTATION
- T037 COLLINSVILLE POWER STATION SWITCHYARD
- T038 MACKAY SUBSTATION
- T039 PROSERPINE SUBSTATION
- T046 GARBUTT SUBSTATION
- T048 TULLY SUBSTATION
- T049 KAREEYA POWER STATION SWITCHYARD
- T050 INNISFAIL SUBSTATION
- T051 CAIRNS SUBSTATION (Hartley Street)
- T053 KAMERUNGA SUBSTATION
- T054 BARRON GORGE POWER STATION
- T055 TURKINJE SUBSTATION
- T056 TOWNSVILLE SOUTH SUBSTATION
- T065 ALLIGATOR CREEK SUBSTATION
- T067 KEMMIS SUBSTATION
- T069 NEWLANDS SUBSTATION
- T092 DAN GLEESON SUBSTATION (EX CONDON)
- T094 TOWNSVILLE EAST
- T105 OONOOIE (QR)
- T107 COPABELLA SUBSTATION
- T110 PEAK DOWNS SUBSTATION
- T112 MT MCLAREN (QR)
- T129 EDMONTON SUBSTATION

- T134 CARDWELL SUBSTATION
- T137 NORTH GOONYELLA
- T139 BURTON DOWNS SUBSTATION
- T140 TOWNSVILLE ZINC SMELTER SUBSTATION (Korea Zinc)
- T141 PIONEER VALLEY SUBSTATION
- T143 STUART GAS TURBINE and SUBSTATION
- T144 TOWNSVILLE GAS TURBINE PS
- T145 TOWNSVILLE GT SWITCHYARD (YABULU SUB)
- T150 ALAN SHERRIFF SUBSTATION
- T157 INGHAM SOUTH SUBSTATION
- T158 YALKULA SUBSTATION (ERGON)
- T171 EL ARISH SUBSTATION
- T172 MINDI SUBSTATION (Joint QR)
- T175 QR BOLINGBROKE
- T176 LOUISA CREEK SUBSTATION (ERGON)
- T177 KING CREEK
- T178 STONY CREEK
- T181 BOWEN NORTH
- T192 QR MACKAY PORTS SUBSTATION
- T193 CLARE SOUTH SUBSTATION
- T212 GOONYELLA RIVERSIDE SUBSTATION
- T215 EAGLE DOWNS SUBSTATION
- T220 COLLINSVILLE NORTH SUBSTATION
- T221 WOTONGA SUBSTATION
- T240 CLARE FRV SOLAR FARM
- T241 ROSS RIVER SOLAR FARM
- T245 MORANBAH PLAINS
- T255 RUGBY RUN SOLAR FARM
- WRLR WRIGHTS LOOKOUT
- Z005 HAYMAN SOLAR FARM
- Z006 DAYDREAM SOLAR FARM
- Z015 HAUGHTON SOLAR FARM

Concept Estimate for CP.02513 - OpsWAN Replacement Stage 2

Record ID	A3476555	
Policy stream	Asset Management	
Authored by	Project Manager	[redacted]
Reviewed by	Project Manager	[redacted]
Reviewed by	Team Leader	[redacted]
Approved by	Manager of Projects	[redacted]

Table of Contents

1. Executive Summary 3

1.1 Option 1 4

1.2 Option 2 4

2. Project and Site Specific Information 4

2.1 Project Dependencies & Interactions 6

2.2 Site Specific Issues 6

3. Option 1 – Partial Equipment replacement 7

3.1 Definition 7

3.2 Project Execution 10

3.3 Project Estimate 11

3.4 Project Financial Year Cash Flows 11

3.5 Project Asset Classification 11

4. Option 2 – Full Replacement 11

4.1 Definition 11

4.2 Project Execution 12

4.3 Project Estimate 13

4.4 Project Financial Year Cash Flows 14

4.5 Project Asset Classification 14

5. References 14

1. Executive Summary

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different Local Area Network (LAN) architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the Synchronous Digital Hierarchy (SDH) and Internet Protocol (IP)/ Multiprotocol Label Switching (MPLS) network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of Multiprotocol Label Switching – Transport Profile (MPLS-TP), the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement Stage 1 that will replace that currently provided by the IP/MPLS and OpsWAN routers by October 2024 that allow the eventual migration of all services to IP.

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2026 can be achieved with the available/known resources.

1.1 Option 1

1.1.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**19,750,104**	**22,148,785**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.1.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	5,557,787	6,232,789
To June 2024	5,391,440	6,046,239
To June 2025	5,123,329	5,745,565
To June 2026	3,677,548	4,124,192
TOTAL	**19,750,104**	**22,148,785**

1.2 Option 2

1.2.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**24,791,166**	**27,803,469**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.2.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	6,976,369	7,824,048
To June 2024	6,767,564	7,589,871
To June 2025	6,431,019	7,212,434
To June 2026	4,616,214	5,177,117
TOTAL	**24,791,166**	**27,803,469**

2. Project and Site Specific Information

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1.

Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate "OpsWAN" to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in nexus if a proof of concept was successful in deliverable 1 of CP.02512. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

2.1 Project Dependencies & Interactions

This project is dependent on the completion delivery of the following projects:

Project No.	Project Description	Planned Commissioning Date	Comment
Pre-requisite Projects			
CP.02512	OpsWAN Replacement Stage 1	October 2023	Actual commission dates may differ in the future
CP.02771	Telecommunication Network Consolidation Stage 1	December 2023	Actual commission dates may differ in the future
CP.02269	DWDM Replacement	December 2022	Actual commission dates may differ in the future
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	October 2024	Actual commission dates may differ in the future
CP.02812	Telecommunication Network Consolidation Stage 3	October 2025	Actual commission dates may differ in the future
CP.02813	Telecommunication Network Consolidation Stage 4	October 2026	Actual commission dates may differ in the future
CP.02514	OpsWAN Replacement Stage 3	October 2025	Actual commission dates may differ in the future
CP.02822	OpsWAN Replacement Stage 4	October 2026	Actual commission dates may differ in the future

2.2 Site Specific Issues

Not applicable.

3. Option 1 – Partial Equipment replacement

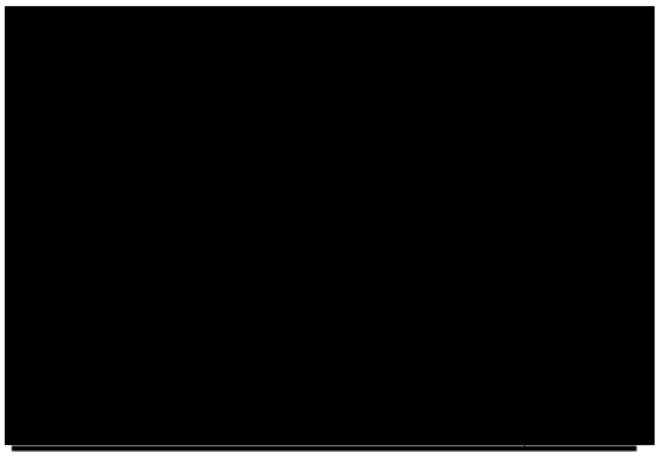
3.1 Definition

Partial replacement to suit 4 broad site types.

3.1.1 Scope

Partial replacement to suit 4 broad site types as per following below.

Solution 1: Site type 1



- Sites where OpsWAN switches are older than the current [redacted] or a mix with older [redacted] switches.
- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2: Site type 2

- [redacted] is the sites core switches and all OpsWAN switches are the current [redacted].
- Only replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3: Site type 3

- All OpsWAN switches are the current [redacted].
- No Site core [redacted] switches on site.
- Existing [redacted] or no MPLS on site.
- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4: Site type 4

- Remote site (hut or repeater or single router/switch).
- Replace the existing device with one single [redacted] with switch blades.

3.1.1.1 Substations Works

Solution 1 - Scope of works:

- Install 2 x new combined PE/CE switches, 2 x servers and 8 x OpsWAN switches in existing panels.
- IP addresses to be reallocated across the site.

Solution 2 - Scope of works:

- Install 2 x new combined PE switches and 2 x servers in existing panels.
- [redacted] OpsWAN switches and CE switches to be retained.
- IP addresses changes not required.

Solution 3 -Scope of works:

- Install 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

Solution 4 -Scope of works:

- Install new combined single PE/CE switch and 1 x server in existing panel.
- IP addresses changes not required.

3.1.1.2 Transmission Line Works

Not applicable.

3.1.1.3 Telecommunication Works

Solution 1 - Scope of works:

- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2 - Scope of works:

- Replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3 -Scope of works:

- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4 -Scope of works:

- Replace the existing device with one single [redacted] with switch blades.

3.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable.

3.1.2 Major Scope Assumptions

Solution specific assumptions:

Solution 1:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers and 1 x building switch), 3 station panels (containing 2 x building switches in each panel) and one LAN panel (containing one building switch).
- Each site has 30 devices which need to have IP address changes.

Solution 2:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).

Solution 3:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).
- Each site has 30 devices which need to have IP address changes.

Solution 4:

- Each site has 1 SIP/MPLS panels (containing 1 x PE/CE, 1 x server).

The following assumptions are applicable to all four site type solutions:

- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- Skilled MSP resource will be available.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.

- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (e.g. SVCs).
- Works associated with change request actions that require protection isolation (e.g. relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.

3.2 Project Execution

3.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2026 can be achieved with the available/known resources.

Task	Target Completion
Project Approval, PAN Issued	June 2022
Design	September 2022 to September 2025
Procurement	July 2022 to October 2022
Telecoms Construction	June 2024 to June 2026
Project completion	June 2026

3.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will no outages required for the execution of this project.

3.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Design Handover stages 1 -8 (9 sites per stage design hand-over)
3	Site Implementation. Stages 1-8

3.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out (multiple crews required).

3.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**19,750,104**	**22,148,785**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

3.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	5,557,787	6,232,789
To June 2024	5,391,440	6,046,239
To June 2025	5,123,329	5,745,565
To June 2026	3,677,548	4,124,192
TOTAL	**19,750,104**	**22,148,785**

3.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	13,299,900	67%
Communications	15 years	6,450,204	33%
TOTAL		**19,750,104**	

4. Option 2 – Full Replacement

4.1 Definition

4.1.1 Scope

Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.1 Substations Works

- Install 2 x OpsWAN switches per building, 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

4.1.1.2 Transmission Line Works

Not applicable.

4.1.1.3 Telecommunication Works

- Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable.

4.1.2 Major Scope Assumptions

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers), 1 x station panel per building (containing 2 x building switches in each panel).
- Each site has 30 devices which need to have IP address changes.
- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- For the full replacement of field network devices, it is assumed that the labour costs associated with the field works would be within 5% variance to the cost of the partial replacement option.
- Skilled MSP resource will be available.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

4.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg: SVCs).
- Works associated with change request actions that require protection isolation (eg: relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.
- Review the current management system is excluded from the scope of works.
- Engage external parties to duplicate the OpsWAN Device register.
- Engage external parties to model OpsWAN network.

4.2 Project Execution

4.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2026 can be achieved with the available/known resources.

Task	Target Completion
Project Approval, PAN Issued	June 2022
Design	September 2022 to September 2025
Procurement	July 2022 to October 2022
Telecoms Construction	June 2024 to June 2026 (Pending on the finalisation of CP.02512 site roll out)
Project completion	June 2026

4.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will be no outages required for the execution of this project.

4.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Control system FAT
3	Construction and commissioning

4.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out (multiple crews required).

4.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**24,791,166**	**27,803,469**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

4.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	6,976,369	7,824,048
To June 2024	6,767,564	7,589,871
To June 2025	6,431,019	7,212,434
To June 2026	4,616,214	5,177,117
TOTAL	**24,791,166**	**27,803,469**

4.5 Project Asset Classification

3	Asset Life	Base $	Percentage
Secondary systems	15 years	16,677,923	67%
Communications	15 years	8,113,244	33%
TOTAL		**24,791,166**	

5. References

Document name	Version	Date
Project Scope Report	1.0	16/09/2020

Project Scope Report

CP.02514

OpsWAN Replacement Stage 3

Concept – Version 1

Document Control

Change Record

Issue Date	Responsible Person	Objective Document Name	Background
16/09/20	[redacted]	Project Scope Report CP.02514 OpsWAN Replacement Stage 3	PSR created

Related Documents

Issue Date	Responsible Person	Objective Document Name
June 2020	[redacted]	OpsWAN Replacement Strategy

Project Contacts

Project Sponsor	[redacted]	[redacted]
Connection & Development Manager	Tba	Ext.
Strategist – HV/Digital Asset Strategies	[redacted]	[redacted]
Grid Planner	tba	Ext.
Manager Projects	tba	Ext.
Project Manager	tba	Ext.
Design Coordinator	tba	Ext.

Project Details

1. Project Need & Objective

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different LAN architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the SDH and IP/MPLS network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of MPLS-TP, the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP by October 2025.

2. Project Drawing

Not applicable.

3. Project Scope

3.1. Original 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 5 Special Considerations*.

The scope of this project will provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP. OpsWAN routers will be decommissioned and services migrated to the new solution. OpsWAN will become a service over the network rather than a network in its own right.

As this project will be delivered in parallel but not necessarily in conjunction with the network consolidation projects, design shall consider the ultimate network architecture with a view to facilitating future cutover works where feasible. It is also intended, within the scope of this project, to reduce the amount of equipment required within the substation where it is feasible to do so.

Briefly, the project consists of the replacement of the OpsWan at the sites identified in Attachment 1.

3.2. Communications Deployment

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1 at the sites listed in Attachment 1. Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate “OpsWAN” to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where a POE switch is installed, IP telephone handsets are to be provided and OTN lines are to be delivered natively over the IP network;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

3.3. Key Scope Assumptions

The following assumptions should be included in the estimating of this scope:

- The solution will be developed within the scope of CP.02512. The scope of this project includes the deployment of the solution to the sites per Attachment 1.

- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.4. Variations to Scope (post project approval)

Not applicable

4. Project Timing

4.1. Project Approval Date

The anticipated date by which the project will be approved is 30 June 2023.

4.2. Site Access Date

The scope of works is at existing Powerlink sites. As a result site access is already available.

4.3. Commissioning Date

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 31 October 2025.

5. Special Considerations

The following matters are important to consider during the implementation of this project:

- Any existing assets to be removed and disposed of as part of this scope must be identified within the estimate together with the forecast early asset write off amounts at time of disposal.

- Plant and equipment identified as suitable to be recovered for use as spares or returned to stores should be packaged and transported to an appropriate storage location, with a suitable allowance for the cost included in the estimate.

6. Asset Management Requirements

Equipment shall be in accordance with Powerlink equipment strategies.

Unless otherwise advised [redacted] will be the Project Sponsor for this project. The Project Sponsor must be included in any discussions with any other areas of Strategy and Business Development.

Business Development will provide the primary customer interface as required. The Project Sponsor should be kept informed of any customer discussions.

7. Asset Ownership

The works detailed in this project will be Powerlink Queensland assets.

8. System Operation Issues

Operational issues that should be considered as part of the scope and estimate include:

- interaction of project outage plan with other outage requirements;
- likely impact of project outages upon grid support arrangements; and
- likely impact of project outages upon the optical fibre network.

9. Options

Not applicable

10. Division of Responsibilities

Not applicable

11. Related Projects

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.02512	OpsWAN Replacement Stage 1	Oct 2023	
CP.02771	Telecommunication Network Consolidation Stage 1	Dec 2022	
CP.02269	DWDM Replacement	Dec 2022	
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	Oct 2024	
CP.02812	Telecommunication Network Consolidation Stage 3	Oct 2025	
CP.02813	Telecommunication Network Consolidation Stage 4	Oct 2026	
CP.02513	OpsWAN Replacement Stage 2	Oct 2024	
CP.02822	OpsWAN Replacement Stage 4	Oct 2026	

Attachment 1

Sites to be considered are detailed below

- H007 GLADSTONE POWER STATION 275 KV SWITCHYARD
- H008 BOYNE ISLAND (COMALCO) SUBSTATION
- H010 BOULDERCOMBE SUBSTATION
- H015 LILYVALE SUBSTATION
- H020 BROADSOUND SUBSTATION
- H024 CALVALE SUBSTATION
- H029 STANWELL POWER STATION SWITCHYARD
- H030 CALLIDE POWER STATION 'B' COMMUNICATIONS ROOM (ANNEX)
- H033 STANWELL POWER STATION ANNEX
- H040 WURDONG SUBSTATION
- H050 CALLIDE POWER STATION 'C' Station Equipment Room
- H058 LARCOM CREEK SUBSTATION
- H067 CALLIOPE RIVER
- H073 QR RAGLAN (Powerlink owned site)
- T019 GLADSTONE SOUTH SUBSTATION
- T021 QAL SUBSTATION SWITCHYARD
- T022 CALLIDE 'A' SUBSTATION
- T023 ROCKHAMPTON SUBSTATION (GLENMORE)
- T026 BILOELA SUBSTATION
- T027 MOURA SUBSTATION
- T031 BARALABA SUBSTATION
- T032 BLACKWATER SUBSTATION
- T035 DYSART SUBSTATION
- T061 PANDOIN SUBSTATION
- T071 CLERMONT SUBSTATION
- T097 GREGORY SUBSTATION
- T099 GRANTLEIGH (QR)
- T101 CALLEMONDAH SUBSTATION
- T127 EGANS HILL SUBSTATION (Joint with ERGON)
- T152 GLADSTONE STH SUBSTATION
- T153 QAL WEST
- T182 QAL SOUTH
- T199 YARWUN SUBSTATION
- T209 QR BLUFF (QR owned site)
- T210 QR DUARINGA (QR owned site)
- T211 QR WYCARBAH (Shared site)
- T244 BUNDOORA SUBSTATION

Concept Estimate for CP.02514 - OpsWAN Replacement Stage 3

Record ID	A3412587	
Policy stream	Asset Management	
Authored by	Project Manager	[redacted]
Reviewed by	Project Manager	[redacted]
Reviewed by	Team Leader	[redacted]
Approved by	Manager of Projects	[redacted]

Table of Contents

1. Executive Summary 3

1.1 Option 1 4

1.2 Option 2 4

2. Project and Site Specific Information 5

2.1 Project Dependencies & Interactions 6

2.2 Site Specific Issues 6

3. Option 1 – Partial Equipment replacement 7

3.1 Definition 7

3.2 Project Execution 10

3.3 Project Estimate 11

3.4 Project Financial Year Cash Flows 11

3.5 Project Asset Classification 11

4. Option 2 – Full Replacement 12

4.1 Definition 12

4.2 Project Execution 13

4.3 Project Estimate 14

4.4 Project Financial Year Cash Flows 14

4.5 Project Asset Classification 14

5. References 14

1. Executive Summary

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different LAN architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the SDH and IP/MPLS network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of MPLS-TP, the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement Stage 1 that will replace that currently provided by the IP/MPLS and OpsWAN routers by October 2025 and allow the eventual migration of all services to IP.

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2028 can be achieved with the available/known resources.

1.1 Option 1

1.1.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**11,143,863**	**13,180,116**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.1.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	34,211	34,270
To June 2024	4,910,929	5,540,078
To June 2025	2,719,607	3,193,811
To June 2026	1,307,411	1,598,328
To June 2027	1,216,511	1,548,176
To June 2028	955,194	1,265,453
TOTAL	**11,143,863**	**13,180,116**

1.2 Option 2

1.2.1 Project Estimate

Estimate Components - Reset 2023-27 Project		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**13,626,669**	**16,098,707**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.2.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	34,332	34,401
To June 2024	5,966,323	6,730,680
To June 2025	3,431,011	4,029,257
To June 2026	1,761,923	2,153,974
To June 2027	1,398,794	1,780,156
To June 2028	1,034,286	1,370,239
TOTAL	**13,626,669**	**16,098,707**

2. Project and Site Specific Information

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1.

Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate “OpsWAN” to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus if a proof of concept was successful in deliverable 1 of CP.02512. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

2.1 Project Dependencies & Interactions

This project is dependent on the completion delivery of the following projects:

Project No.	Project Description	Planned Comm Date	Comment
Dependencies			
CP.02512	OpsWAN Replacement Stage 1	October 2023	Actual commission dates may differ in the future
CP.02771	Telecommunication Network Consolidation Stage 1	December 2023	Actual commission dates may differ in the future
CP.02269	DWDM Replacement	December 2022	Actual commission dates may differ in the future
Interactions			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	October 2024	Actual commission dates may differ in the future
CP.02812	Telecommunication Network Consolidation Stage 3	October 2025	Actual commission dates may differ in the future
CP.02813	Telecommunication Network Consolidation Stage 4	October 2026	Actual commission dates may differ in the future
CP.02513	OpsWAN Replacement Stage 2	October 2024	Actual commission dates may differ in the future
CP.02822	OpsWAN Replacement Stage 4	October 2026	Actual commission dates may differ in the future

2.2 Site Specific Issues

Not applicable.

3. Option 1 – Partial Equipment replacement

3.1 Definition

Partial replacement to suit 4 broad site types.

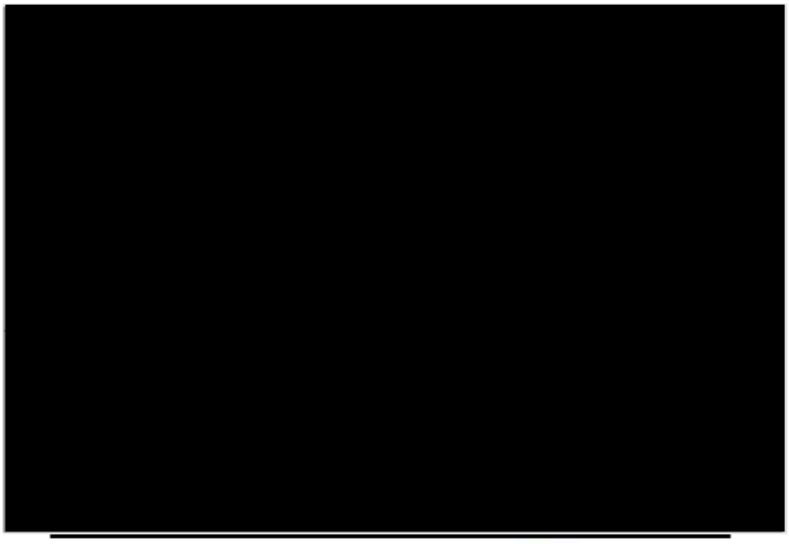
3.1.1 Scope

Partial replacement to suit 4 broad site types as per following below.

Solution 1: Site type 1

- Sites where OpsWAN switches are older than the current [redacted] or a mix with older [redacted] switches.
- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2: Site type 2



- [redacted] is the sites core switches and all OpsWAN switches are the current [redacted].
- Only replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3: Site type 3

- All OpsWAN switches are the current [redacted]
- No Site core [redacted] switches on site.
- Existing Huawei MPLS or no MPLS on site.
- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4: Site type 4

- Remote site (hut or repeater or single router/switch).
- Replace the existing device with one single [redacted] with switch blades.

3.1.1.1 Substations Works

Solution 1 - Scope of works:

- Install 2 x new combined PE/CE switches, 2 x servers and 8 x OpsWAN switches in existing panels.
- IP addresses to be reallocated across the site.

Solution 2 - Scope of works:

- Install 2 x new combined PE switches and 2 x servers in existing panels.
- Ruggedcom OpsWAN switches and CE switches to be retained.
- IP addresses changes not required.

Solution 3 -Scope of works:

- Install 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

Solution 4 -Scope of works:

- Install new combined single PE/CE switch and 1 x server in existing panel.
- IP addresses changes not required.

3.1.1.2 Transmission Line Works

Not applicable

3.1.1.3 Telecommunication Works

Solution 1 - Scope of works:

- A full solution PE and CE combined, all OpsWAN switches are replaced to POE
- Possibly provisioning SCADA where possible.

Solution 2 - Scope of works:

- Replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3 -Scope of works:

- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4 -Scope of works:

- Replace the existing device with one single [redacted] with switch blades.

3.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable

3.1.2 Major Scope Assumptions

Solution specific assumptions:

Solution 1:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers and 1 x building switch), 3 station panels (containing 2 x building switches in each panel) and one LAN panel (containing one building switch).
- Each site has 30 devices which need to have IP address changes.

Solution 2:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).

Solution 3:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).
- Each site has 30 devices which need to have IP address changes.

Solution 4:

Each site has 1 SIP/MPLS panels (containing 1 x PE/CE, 1 x server).

The following assumptions are applicable to all four site type solutions:

- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN..

3.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg. SVCs).
- Works associated with change request actions that require protection isolation (eg. relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.

3.2 Project Execution

3.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2028 can be achieved with the available/known resources.

Stage	Description/Tasks
Project Approval, PAN Issued	June 2023
Design	September 2023 to September 2026
Procurement	July 2023 to October 2024
Telecoms Construction	June 2026 – June 2028
Project completion	June 2028

3.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will no outages required for the execution of this project.

3.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Design Handover stages 1 -6 (6 sites per stage design hand-over)
3	Site Implementation. Stages 1-6

3.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out.

3.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**11,143,863**	**13,180,116**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

3.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	34,211	34,270
To June 2024	4,910,929	5,540,078
To June 2025	2,719,607	3,193,811
To June 2026	1,307,411	1,598,328
To June 2027	1,216,511	1,548,176
To June 2028	955,194	1,265,453
TOTAL	**11,143,863**	**13,180,116**

3.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	7,006,768	63%
Communications	15 years	4,137,095	37%
TOTAL		**11,143,863**	

4. Option 2 – Full Replacement

4.1 Definition

4.1.1 Scope

Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.1 Substations Works

- Install 2 x OpsWAN switches per building, 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

4.1.1.2 Transmission Line Works

Not applicable.

4.1.1.3 Telecommunication Works

- Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.4 Easement/Land Acquisition & Permit Works

Not Applicable.

4.1.2 Major Scope Assumptions

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers), 1 x station panel per building (containing 2 x building switches in each panel).
- Each site has 30 devices which need to have IP address changes.
- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- For the full replacement of field network devices, it is assumed that the labour costs associated with the field works would be within 5% variance to the cost of the partial replacement option.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

4.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg: SVCs).
- Works associated with change request actions that require protection isolation (eg: relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.
- Review the current management system is excluded from the scope of works.
- Engage external parties to duplicate the OpsWAN Device register.
- Engage external parties to model OpsWAN network.

4.2 Project Execution

4.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2028 can be achieved with the available/known resources.

Stage	Description/Tasks
Project Approval, PAN Issued	June 2023
Design	September 2023 to September 2026
Procurement	July to October 2024
Telecoms Construction	June 2026 to June 2028
Project completion	June 2028

4.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will be no outages required for the execution of this project.

4.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Control system FAT
3	Construction and commissioning

4.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out.

4.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**13,626,669**	**16,098,707**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

4.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2023	34,332	34,401
To June 2024	5,966,323	6,730,680
To June 2025	3,431,011	4,029,257
To June 2026	1,761,923	2,153,974
To June 2027	1,398,794	1,780,156
To June 2028	1,034,286	1,370,239
TOTAL	**13,626,669**	**16,098,707**

4.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	8,682,937	64%
Communications	15 years	4,943,732	36%
TOTAL		**13,626,669**	

5. References

Document name	Version	Date
Project Scope Report	1.0	16/09/2020

Project Scope Report

CP.02822

OpsWAN Replacement Stage 4

Concept – Version 1

Document Control

Change Record

Issue Date	Responsible Person	Objective Document Name	Background
16/09/20	[redacted]	Project Scope Report CP.02822 OpsWAN Replacement Stage 4	PSR created

Related Documents

Issue Date	Responsible Person	Objective Document Name
June 2020	[redacted]	OpsWAN Replacement Strategy

Project Contacts

Project Sponsor	[redacted]	[redacted]
Connection & Development Manager	Tba	Ext.
Strategist – HV/Digital Asset Strategies	[redacted]	[redacted]
Grid Planner	tba	Ext.
Manager Projects	tba	Ext.
Project Manager	tba	Ext.
Design Coordinator	tba	Ext.

Project Details

1. Project Need & Objective

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different LAN architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the SDH and IP/MPLS network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of MPLS-TP, the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP by October 2026.

2. Project Drawing

Not applicable.

3. Project Scope

3.1. Original 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 5 Special Considerations*.

The scope of this project will provide functionality within the substation environment that will replace that currently provided by the IP/MPLS and OpsWAN routers and allow the eventual migration of all services to IP. OpsWAN routers will be decommissioned and services migrated to the new solution. OpsWAN will become a service over the network rather than a network in its own right.

As this project will be delivered in parallel but not necessarily in conjunction with the network consolidation projects, design shall consider the ultimate network architecture with a view to facilitating future cutover works where feasible. It is also intended, within the scope of this project, to reduce the amount of equipment required within the substation where it is feasible to do so.

Briefly, the project consists of the replacement of the OpsWAN at the sites identified in Attachment 1.

3.2. Communications Deployment

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1 at the sites listed in Attachment 1. Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate “OpsWAN” to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where a POE switch is installed, IP telephone handsets are to be provided and OTN lines are to be delivered natively over the IP network;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

3.3. Key Scope Assumptions

The following assumptions should be included in the estimating of this scope:

- The solution will be developed within the scope of CP.02512. The scope of this project includes the deployment of the solution to the sites per Attachment 1.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.4. Variations to Scope (post project approval)

Not applicable.

4. Project Timing

4.1. Project Approval Date

The anticipated date by which the project will be approved is 30 June 2024.

4.2. Site Access Date

The scope of works is at existing Powerlink sites. As a result site access is already available.

4.3. Commissioning Date

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 31 October 2026.

5. Special Considerations

The following matters are important to consider during the implementation of this project:

- Any existing assets to be removed and disposed of as part of this scope must be identified within the estimate together with the forecast early asset write off amounts at time of disposal; and
- Plant and equipment identified as suitable to be recovered for use as spares or returned to stores should be packaged and transported to an appropriate storage location, with a suitable allowance for the cost included in the estimate.

6. Asset Management Requirements

Equipment shall be in accordance with Powerlink equipment strategies.

Unless otherwise advised [redacted] will be the Project Sponsor for this project. The Project Sponsor must be included in any discussions with any other areas of Strategy and Business Development.

Business Development will provide the primary customer interface as required. The Project Sponsor should be kept informed of any customer discussions.

7. Asset Ownership

The works detailed in this project will be Powerlink Queensland assets.

8. System Operation Issues

Operational issues that should be considered as part of the scope and estimate include:

- interaction of project outage plan with other outage requirements;
- likely impact of project outages upon grid support arrangements; and
- likely impact of project outages upon the optical fibre network.

9. Options

Not applicable.

10. Division of Responsibilities

Not applicable.

11. Related Projects

Project No.	Project Description	Planned Comm Date	Comment
Pre-requisite Projects			
CP.02512	OpsWAN Replacement Stage 1	Oct 2023	
CP.02771	Telecommunication Network Consolidation Stage 1	Oct 2023	
CP.02269	DWDM Replacement	Dec 2022	
Co-requisite Projects			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	Oct 2024	
CP.02812	Telecommunication Network Consolidation Stage 3	Oct 2025	
CP.02813	Telecommunication Network Consolidation Stage 4	Oct 2026	
CP.02513	OpsWAN Replacement Stage 2	Oct 2024	
CP.02514	OpsWAN Replacement Stage 3	Oct 2025	

Attachment 1

Sites to be considered are detailed below:

- CCBR BRENDALE DISASTER RECOVERY SITE
- CCVP SEQEB VICTORIA PARK (COMMS)
- DUMQ Dumaresq 330kV Substation (Transgrid)
- DURR Durong Road Fibre Optic Repeater
- EHTR EAGLE HEIGHTS MICROWAVE REPEATER
- H002 SOUTH PINE SUBSTATION
- H003 BELMONT SUBSTATION
- H004 MUDGEERABA SUBSTATION
- H005 WOOLOOGA SUBSTATION
- H006 GIN GIN SUBSTATION
- H009 PALMWOODS SUBSTATION
- H012 MOUNT ENGLAND SUBSTATION
- H014 MIDDLE RIDGE SUBSTATION
- H016 ROCKLEA SUBSTATION
- H018 TARONG SUBSTATION
- H021 MURARRIE
- H022 LOGANLEA SUBSTATION
- H023 UPPER KEDRON SUBSTATION
- H027 TARONG POWER STATION, 1-2 CONTROL ROOM
- H028 WIVENHOE POWER STATION
- H031 MOLENDINAR SUBSTATION - POWERLINK (H31)
- H036 BLACKWALL SUBSTATION
- H038 GOODNA SUBSTATION
- H049 AUBURN RIVER FIBRE OPTIC REPEATER
- H051 SWANBANK E SUBSTATION
- H061 LARAPINTA SUBSTATION
- H062 ABERMAIN SUBSTATION (275 kV)
- H063 TEEBAR CREEK
- H071 DARLING DOWNS POWER STATION (ORIGIN ENERGY)
- H072 H072 BLACKSTONE 275/110 kV SUBSTATION
- H075 KUMBARILLA PARK SUBSTATION
- H081 FAIRVIEW SOUTH
- H085 COOPERS GAP WIND FARM

- H086 Darling Downs Solar Farm
- HOMS Brisbane, 61 Mary Street
- MDVR MOUNT DOMVILLE REPEATER (QPS Site)
- MMBR MOUNT MOWBULLAN MICROWAVE REPEATER (Energy Queensland Site)
- MTGR MOUNT GRAVATT MICROWAVE REPEATER
- PLVC POWERLINK VIRGINIA COMPLEX
- QGCC QGC Control Centre - Chinchilla
- R002 R2 BRAEMAR 330kV/275kV SUBSTATION
- R003 R3 BULLI CREEK 330kV SUBSTATION
- R004 MILLMERRAN SWITCHYARD
- R005 MILLMERRAN POWER STATION
- S002 HALYS SUBSTATION
- S003 GREENBANK SUBSTATION
- T013 CHINCHILLA SUBSTATION (ERGON)
- T080 REDBANK PLAINS SUBSTATION
- T091 MOLENDINAR SUBSTATION
- T136 ABERMAIN SUBSTATION (110 kV)
- T142 TENNYSON SUBSTATION (Joint site with ENERGEX)
- T146 OAKEY SUBSTATION (and GT Powerstation)
- T147 TANGKAM SUBSTATION
- T155 WEST DARRA SUBSTATION
- T160 SUMNER SUBSTATION
- T161 ALGESTER SUBSTATION
- T162 BUNDAMBA SUBSTATION
- T187 RICHLANDS SUBSTATION
- T189 OAKEY TOWN SUBSTATION
- T194 COLUMBOOLA 132 kV (Ex ERGON)

Concept Estimate for CP.02822 - OpsWAN Replacement Stage 4

Record ID	A3412591	
Policy stream	Asset Management	
Authored by	Project Manager	[redacted]
Reviewed by	Project Manager	[redacted]
Reviewed by	Team Leader	[redacted]
Approved by	Manager of Projects	[redacted]

Table of Contents

1. Executive Summary 3

1.1 Option 1 4

1.2 Option 2 4

2. Project and Site Specific Information 5

2.1 Project Dependencies & Interactions 6

2.2 Site Specific Issues 6

3. Option 1 – Partial Equipment Replacement 7

3.1 Option Definition 7

3.2 Project Execution 10

3.3 Project Estimate 11

3.4 Project Financial Year Cash Flows 11

3.5 Project Asset Classification 11

4. Option 2 – Full Replacement 11

4.1 Definition 11

4.2 Project Execution 13

4.3 Project Estimate 13

4.4 Project Financial Year Cash Flows 14

4.5 Project Asset Classification 14

5. References 14

1. Executive Summary

Powerlink's Operational Wide Area Network (OpsWAN) enables data communications between Powerlink's corporate head office, the BCS, remote substations and telecommunications sites. This data network supports a wide range of real time and business support services such as the HV network operation decision support, HV asset condition monitoring and maintenance, and Corporate Services and as such is critical to the operation of the HV network.

The provision of the OpsWAN network has typically been deployed within the scope of substation refurbishments and secondary systems replacements, and as such has varied in architecture dependent on the design standards in place at the time of implementation.

This has resulted in different LAN architectures and varying equipment and whilst the majority of the switches in the LAN have been replaced over time, the devices that perform the routing functionality can no longer be procured, and are either beyond manufacturer support or in a support mode.

Powerlink will be replacing the SDH and IP/MPLS network with a hybrid multiplexor configured with SDH and MPLS-TP which will provide the transmission function. With the introduction of MPLS-TP, the current routing functionality provided by the [redacted] will be removed and an alternative IP routing solution for substations will be required.

The objective of this project is to provide the functionality within the substation environment determined under CP.02512 OpsWAN Replacement Stage 1 that will replace that currently provided by the IP/MPLS and OpsWAN routers by October 2026 (schedule pushed out due to resource constraint) and allow the eventual migration of all services to IP.

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2030 can be achieved with the available/known resources.

1.1 Option 1

1.1.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**16,312,545**	**20,266,885**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.1.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2024	3,934,902	3,935,081
To June 2025	3,226,282	4,468,853
To June 2026	3,789,174	4,632,316
To June 2027	3,257,465	3,654,823
To June 2028	748,124	1,186,014
To June 2029	826,303	1,367,060
To June 2030	530,295	1,022,738
TOTAL	**16,312,545**	**20,266,885**

1.2 Option 2

1.2.1 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**21,003,925**	**26,157,708**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

1.2.2 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2024	3,934,494	3,934,621
To June 2025	4,824,314	6,345,525
To June 2026	4,729,266	5,781,591
To June 2027	3,954,860	4,542,353
To June 2028	1,563,533	2,266,280
To June 2029	1,224,711	1,916,518
To June 2030	772,746	1,370,820
TOTAL	**21,003,925**	**26,157,708**

2. Project and Site Specific Information

The scope of work includes the design, procurement, installation, testing and commissioning of new OpsWAN solution determined by CP.02512 OpsWAN Replacement Stage 1.

Within the scope of work:

- Procure the requisite equipment;
- Install and test the new equipment;
- Migrate “OpsWAN” to the new solution and decommission the existing OpsWAN routers. Ensure the solution addresses cut over requirements;
- Migrate any services that are provided by the [redacted] to the new system;
- OpsWAN switches that do not comply with the current standard are to be replaced with a POE capable device;
- Where possible a minimum of 100Mbit is to be provisioned for OpsWAN services at the substation;
- As a minimum all devices deployed and their logical connections are to be modelled in neXus if a proof of concept was successful in deliverable 1 of CP.02512. Any additional functionality deemed acceptable in the proof of concept in CP.02512 is also to be implemented;
- Decommission and recover all redundant equipment, and update drawing records, SAP records, configuration files, etc. accordingly; and
- All records across systems are to be updated and in alignment with each other.

2.1 Project Dependencies & Interactions

This project is dependent on the completion delivery of the following projects:

3	Project Description	Planned Commissioning Date	Comment
Dependencies			
CP.02512	OpsWAN Replacement Stage 1	October 2023	Actual commission dates may differ in the future
CP.02771	Telecommunication Network Consolidation Stage 1	December 2023	Actual commission dates may differ in the future
CP.02269	DWDM Replacement	December 2022	Actual commission dates may differ in the future
Interactions			
Other Related Projects			
CP.02811	Telecommunication Network Consolidation Stage 2	October 2024	Actual commission dates may differ in the future
CP.02812	Telecommunication Network Consolidation Stage 3	October 2025	Actual commission dates may differ in the future
CP.02813	Telecommunication Network Consolidation Stage 4	October 2026	Actual commission dates may differ in the future
CP.02513	OpsWAN Replacement Stage 2	October 2024	Actual commission dates may differ in the future
CP.02514	OpsWAN Replacement Stage 3	October 2025	Actual commission dates may differ in the future

2.2 Site Specific Issues

Not applicable

3. Option 1 – Partial Equipment Replacement

3.1 Option Definition

Partial replacement to suit 4 broad site types.

3.1.1 Scope

Partial replacement to suit 4 broad site types as per following below.

Solution 1: Site type 1

- Sites where OpsWAN switches are older than the current [redacted] or a mix with older [redacted] switches.
- A full solution PE and CE combined, all OpsWAN switches are replaced to POE.
- Possibly provisioning SCADA where possible.

Solution 2: Site type 2

- [redacted] is the sites core switches and all OpsWAN switches are the current [redacted].
- Only replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3: Site type 3

- All OpsWAN switches are the current [redacted]
- No Site core [redacted] switches on site.
- Existing [redacted] or no MPLS on site.
- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4: Site type 4

- Remote site (hut or repeater or single router/switch).
- Replace the existing device with one single [redacted] with switch blades.

3.1.1.1 Substations Works

Solution 1 - Scope of works:

- Install 2 x new combined PE/CE switches, 2 x servers and 8 x Opswan switches in existing panels.
- IP addresses to be reallocated across the site.

Solution 2 - Scope of works:

- Install 2 x new combined PE switches and 2 x servers in existing panels.
- [redacted] OpsWAN switches and CE switches to be retained.
- IP addresses changes not required.

Solution 3 -Scope of works:

- Install 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

Solution 4 -Scope of works:

- Install new combined single PE/CE switch and 1 x server in existing panel.
- IP addresses changes not required.

3.1.1.2 Transmission Line Works

Not applicable

3.1.1.3 Telecommunication Works

Solution 1 - Scope of works:

- A full solution PE and CE combined, all OpsWAN switches are replaced to POE
- Possibly provisioning SCADA where possible.

Solution 2 - Scope of works:

- Replace the [redacted] with the [redacted] with only routing and no switch blades.

Solution 3 -Scope of works:

- Replace the existing [redacted] with the [redacted] with switch blades.

Solution 4 -Scope of works:

- Replace the existing device with one single [redacted] with switch blades.

3.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable

3.1.2 Major Scope Assumptions

Solution specific assumptions:

Solution 1:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers and 1 x building switch), 3 station panels (containing 2 x building switches in each panel) and one LAN panel (containing one building switch).
- Each site has 30 devices which need to have IP address changes.

Solution 2:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).

Solution 3:

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers).
- Each site has 30 devices which need to have IP address changes.

Solution 4:

- Each site has 1 SIP/MPLS panels (containing 1 x PE/CE, 1 x server).

The following assumptions are applicable to all four site type solutions:

- No new panels are required (equipment can be retrofitted in existing panels) .
- Combined PE/CE function in a singular box if possible.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- Skilled MSP resource will be available.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.

- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

3.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg. SVCs).
- Works associated with change request actions that require protection isolation (eg. relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.

3.2 Project Execution

3.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2030 can be achieved with the available/known resources.

Item	Timing
Project Approval, PAN Issued	June 2024
Design	September 2024 to September 2028
Procurement	July 2024 to October 2025
Telecoms Construction	June 2028 to June 2030
Project completion	June 2030

3.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will no outages required for the execution of this project.

3.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Design Handover stages 1 -10 (6 sites per stage design hand-over)
3	Site Implementation. Stages 1-10

3.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design, MSP for sites roll out (multiple crews required).

3.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**16,312,545**	**20,266,885**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

3.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2024	3,934,902	3,935,081
To June 2025	3,226,282	4,468,853
To June 2026	3,789,174	4,632,316
To June 2027	3,257,465	3,654,823
To June 2028	748,124	1,186,014
To June 2029	826,303	1,367,060
To June 2030	530,295	1,022,738
TOTAL	**16,312,545**	**20,266,885**

3.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	10,780,984	66%
Communications	15 years	5,531,561	34%
TOTAL		**16,312,545**	

4. Option 2 – Full Replacement

4.1 Definition

4.1.1 Scope

Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.1 Substations Works

- Install 2 x Opswan switches per building, 2 x new combined PE/CE switches and 2 x servers in existing panels.
- IP addresses to be reallocated across the site.

4.1.1.2 Transmission Line Works

Not applicable.

4.1.1.3 Telecommunication Works

- Replace all OpsWAN equipment on site including PE/CE, servers, OpsWAN switches, serial port servers and other miscellaneous equipment.

4.1.1.4 Easement/Land Acquisition & Permit Works

Not applicable.

4.1.2 Major Scope Assumptions

- Each site has 2 SIP/MPLS panels (containing 2 x PE/CE, 2 x servers), 1 x station panel per building (containing 2 x building switches in each panel).
- Each site has 30 devices which need to have IP address changes.
- No new panels are required (equipment can be retrofitted in existing panels).
- Combined PE/CE function in a singular box if possible.
- For the full replacement of field network devices, it is assumed that the labour costs associated with the field works would be within 5% variance to the cost of the partial replacement option
- Skilled MSP resource will be available.
- Procurement cost is based on indicative pricing of similar equipment only, detailed devices to be determined during the development phase of this project upon execution.
- No network outages required.
- The replacement solution and methodology will be developed within the scope of CP.02512.
- The DWDM replacement and Telecommunications Network Consolidation works at the relevant sites will have been completed prior to replacement of the OpsWAN.

4.1.3 Scope Exclusions

- Any SCADA cutover and testing that may require EMS changes to database etc.
- Works associated with any outages that may be required (eg: SVCs).
- Works associated with change request actions that require protection isolation (eg: relay IP changes).
- Changes to existing services that aren't connected to the existing OpsWAN switches, for example upgrading phone system to VoiP phones and changes to metering communications infrastructure at site.
- Review the current management system is excluded from the scope of works.
- Engage external parties to duplicate the OpsWAN Device register.
- Engage external parties to model OpsWAN network.

4.2 Project Execution

4.2.1 Project Schedule

Provisional review of resource requirements and the scarcity of the required skilled resource will delay completion of the project. It is anticipated that a completion of June 2030 can be achieved with the available/known resources.

Item	Timing
Project Approval, PAN Issued	June 2024
Design	September 2024 to September 2028
Procurement	July2024 to October 2025
Telecoms Construction	June 2028 to June 2030
Project completion	June 2030

4.2.2 Network Impacts

During the concept estimate phase and the scope of the works it is assumed there will be no outages required for the execution of this project.

4.2.3 Project Staging

Stage	Description/Tasks
1	Design
2	Control system FAT
3	Construction and commissioning

4.2.4 Resourcing

The delivery of this project is based on utilising a combination of the following resources Powerlink Design (internal and DSP), MSP for sites roll out (multiple crews available).

4.3 Project Estimate

Estimate Components		Base $	Escalated $
Estimate Class	5		
Estimate Accuracy	+100% / -50%		
Base Estimate		**21,003,925**	**26,157,708**
Mitigated Risk	[redacted]	[redacted]	[redacted]
Contingency Allowance	[redacted]	[redacted]	[redacted]
TOTAL		[redacted]	[redacted]

4.4 Project Financial Year Cash Flows

	June 2020 Base $	Escalated $
To June 2024	3,934,494	3,934,621
To June 2025	4,824,314	6,345,525
To June 2026	4,729,266	5,781,591
To June 2027	3,954,860	4,542,353
To June 2028	1,563,533	2,266,280
To June 2029	1,224,711	1,916,518
To June 2030	772,746	1,370,820
TOTAL	**21,003,925**	**26,157,708**

4.5 Project Asset Classification

Asset Class	Asset Life	Base $	Percentage
Secondary systems	15 years	13,944,507	66%
Communications	15 years	7,059,418	34%
TOTAL		**21,003,924**	

5. References

Document name	Version	Date
Project Scope Report	1.0	16/09/2020