

Darwin to Alice Springs communications

Regulatory Business Case (RBC) 2024-29

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1. Summary

This business case has been prepared to support the 2024-29 Regulatory Proposal. The business case demonstrates that Power and Water has undertaken appropriate analysis of the need for the expenditure and identified credible options that will resolve the need and ensure that Power and Water continues to meet the National Electricity Objectives and maintain the quality, reliability, and security of supply of standard control services and maintain the safety of the distribution system.

The proposed investment identified in this business case will undergo further assessment and scrutiny through Power and Water's normal governance processes prior to implementation and delivery.

This business case addresses high risk of loss of communications contributing to safety and network issues in Alice Springs.

1.1 Business need

Power and Water's communications between Darwin and Alice Springs currently relies on a single communications link that is supplied by a third party service provider. This has two key problems that need to be resolved:

- The reliability and available of the communications link are below performance standards that are required by industry. During the 12 month period ending 31 August 2020, Power and Water received an availability of 99.78% which is significantly lower than industry standards that typically exceed 99.99%¹.
- Power and Water is required by regulations to provide a communications network to ensure the secure and reliable operation of the electricity network. To achieve compliance with this requirement, Power and Water must act to ensure reliability communications between Darwin and Alice Springs. A summary of the compliance requirements are set out in Appendix B.
- The 2019 Alice Springs system black event investigation, and corresponding AGC review, recommended that Power and Water implement an alternative Darwin to Alice Springs communications pathway to ensure there is N-1 redundancy.

The risk has been assessed as High. Power and Water must invest to address the availability issue of the communications link and to ensure they remain compliant with their obligations.

1.2 Options analysis

Two options were considered as described in Table 1.

Table 1 Summary of credible options

Option No.	Description	Recommended
1	Do nothing	No
2	Implement and alternative communications link	Yes

¹ POWER SYSTEM DATA COMMUNICATION STANDARD, Australian Energy Market Operator, 1st December 2017.

1.3 Recommendation

The recommended option is Option 2 – implement an alternative communications link, at an estimated cost of \$0.9 million (real 2021/22), to be most prudent and cost effective to meet the identified needs. Option 2 mitigates risk to an appropriate level over an acceptable timeframe.

Table 2 shows a summary of the expenditure requirements for the 2024-29 regulatory period.

Table 2 Annual capital and operational expenditure (\$'000, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	-	-	874	-	-	874
Opex	-	-	-	-	-	-
Total	-	-	874	-	-	874

2. Identified need

This section provides the background and context to this business case, identifies the issues that are posing increasing risks to Power and Water and its customers, describes the current mitigation program and its delivery status, highlights the consequence of asset failure, and provides a risk assessment of the inherent risk if no investment is undertaken.

2.1 Asset profile

Power and Water's communications between Darwin and Alice Springs currently relies on a single communications link that is supplied by a third party service provider. This link is essential for Automatic Generator Control (AGC) – a system that automatically dispatches generators based on set points.

2.2 Current performance

The reliability and availability of the communications link are below performance standards that are required by industry. This performance was described in a review of generator control undertaken following the October 2019 Alice Springs system black². Specifically, Power and Water received an availability of 99.78% for the 12 month period ending 31 August 2020 which is significantly lower than industry standards that typically exceed 99.99%³. The frequency and duration of outages that contributed to this poor performance is shown in Figure 1. These outages are defined as being when communications have completely failed.

A recommendation from the AGC review was to implement an alternative Darwin to Alice Springs communications pathway to ensure there is N-1 redundancy.

² Automatic Generator Control Review, Power System Consultants Australia, 15 October 2020

³ POWER SYSTEM DATA COMMUNICATION STANDARD, Australian Energy Market Operator, 1st December 2017.

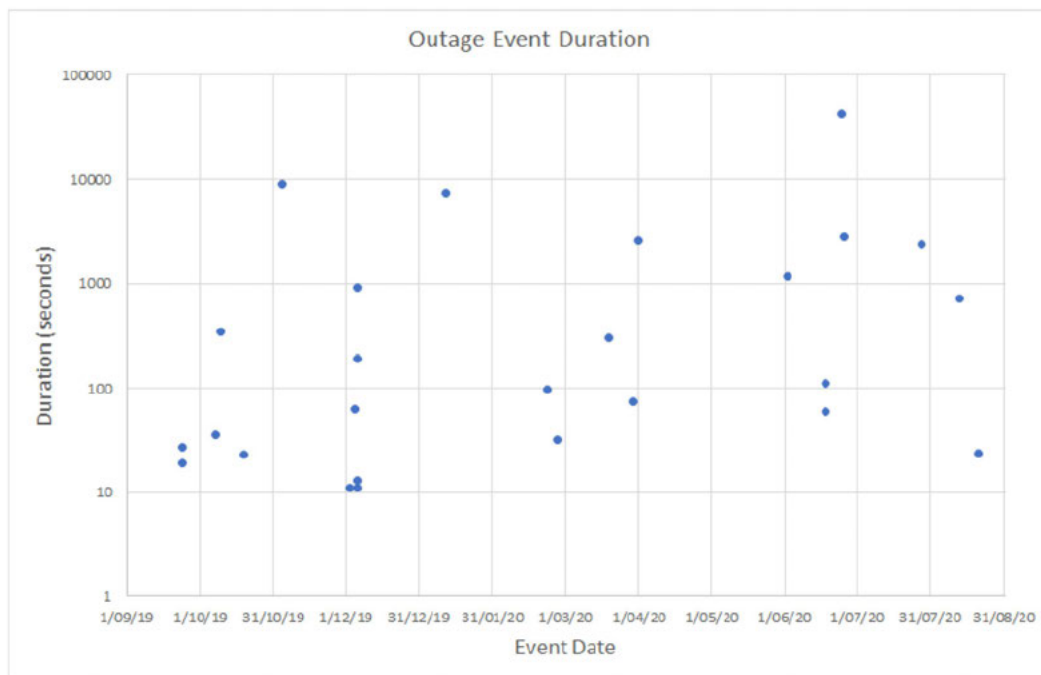


Figure 1 Alice Springs to Darwin communications outage events

2.3 Regulatory and code compliance requirements

Power and Water is required by regulations to provide a communications network to ensure the secure and reliable operation of the electricity network. To achieve compliance with this requirement, Power and Water must act to ensure reliability communications between Darwin and Alice Springs.

A summary of the compliance requirements are set out in Appendix B.

2.4 Current management programs

There are no relevant management programs in place.

2.5 Risk assessment

Power and Water has developed the Risk Quantification Procedure to enable consistent quantification of risk from their assets into dollar terms. The procedure is applicable to most assets where there is a direct link between an asset failure and the impact of that failure on the defined consequence categories.

However, since we currently do not have adequate data to undertake a quantitative analysis on the impact of the poor service currently received on the communications link, a qualitative assessment of the risk has been undertaken using the relevant key consequence areas set out in the Risk Quantification Procedure.

The communications link is critical for control of the Alice Springs network to undertake network switching operations and to have visibility of the network status. Without adequate reliability there is a high risk of loss of communications contributing issues in Alice Springs including:

- **Health and Safety:** Loss of visibility of the network could endanger Power and Water's field crews and the public through failure to manage the network configuration to isolate faults or through operation of switches that could energise faulted sections of the network.

- **Service delivery:** Loss of visibility of the network could result in delayed response times, extending outages and therefore result in poor service to our customers

The risk assessment is shown in Figure 2 in the matrix format as specified in the Enterprise Risk Management Standard. It shows the current level of risk and the target level of risk when the poor service level issue is mitigated.

	Insignificant	Minor	Moderate	Major	Severe
Almost certain	Medium	High	Very High	Extreme	Extreme
Likely	Low	Medium	High	Very High	Extreme
Possible	Low	Low	Medium	High	Very High
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	Medium

Figure 2 Qualitative risk assessment

2.6 Summary

Power and Water's communications between Darwin and Alice Springs currently relies on a single communications link that is supplied by a third party service provider. This has two key problems that need to be resolved:

- The reliability and availability of the communications link are below performance standards that are required by industry. During the 12 month period ending 31 August 2020, Power and Water received an availability of 99.78% which is significantly lower than industry standards that typically exceed 99.99%⁴.
- Power and Water is required by regulations to provide a communications network to ensure the secure and reliable operation of the electricity network. To achieve compliance with this requirement, Power and Water must act to ensure reliability communications between Darwin and Alice Springs.
- The 2019 Alice Springs system black event investigation, and corresponding AGC review, recommended that Power and Water implement an alternative Darwin to Alice Springs communications pathway to ensure there is N-1 redundancy.

The risk has been assessed as High. Power and Water must invest to address the availability issue of the communications link and to ensure they remain compliant with their obligations.

⁴ POWER SYSTEM DATA COMMUNICATION STANDARD, Australian Energy Market Operator, 1st December 2017.

3. Options analysis

This section describes the various options that were analysed to address the increasing risk to identify the recommended option.

3.1 Comparison of credible options

Credible options are identified as options that address the identified need, are technically feasible and can be implemented within the required timeframe. The following options have been identified:

- Option 1 - Do nothing
- Option 2 - implement an alternative communications link

Table 3 provides a high-level comparison of the two identified credible options. A detailed discussion of each option is provided in the following sections.

Table 3 Summary of options analysis outcomes

Assessment metrics	Option 1	Option 2
NPC (\$'000, real FY22)	-	763
BCR	NA	NA
Capex (\$'000, real FY22)	0	874
Meets customer expectations	○	●
Aligns with Asset Objectives	○	●
Technical Viability	●	●
Deliverability	●	●
Preferred	✕	✓

- Fully addressed the issue ◐ Adequately addressed the issue ◑ Partially addressed the issue ○ Did not address the issue

3.1.1 Option 1 - Do nothing

This option proposes to not follow the recommendations of the review and to continue with reliance on a single communications pathway between Darwin and Alice Springs. This involves accepting the lower level of availability of the service than is common across industry.

This option will not enable Power and Water to:

- Address recommendations of the review.
- Achieve compliance with the Technical Code.
- Address the single point of failure risk.

Taking this approach is likely to impact generator dispatch and could lead to network disruptions and possibly contribute to another system black of the Alice Springs network. This would have significant negative impacts on Power and Water and its reputation.

This option is not recommended.

3.1.2 Option 2 - implement an alternative communications link

Option 2 proposes to implement an alternative communications link between Darwin and Alice Springs to ensure the industry standard level of availability and reliability is achieved. This will be achieved by constructing the end assets of the communications link and renting a wavelength service (Lambda service) from an alternative communications supplier.

A detailed cost estimate has been developed with the total cost estimated at \$873,962 (real 2021/22). This project is proposed to be implemented in 2026/27 due to the time required to establish a new service level agreement with the service provider, as well as due to prioritisation with other project commitments and the resource constraints of the small team.

The benefit of this option is to improve availability and reliability of the communications link from Darwin to Alice Springs which will ensure proper functioning of the AGC and therefore help ensure network stability and security in Alice Springs. This will help avoid a future system black event.

This option is recommended.

3.2 Non-credible options

No other options were identified.

4. Recommendation

The recommended option is Option 2 - implement an alternative communications link, at an estimated cost of \$0.9 million (real 2021/22), to be the most prudent and cost effective to meet the identified needs.

This option mitigates the risks arising from loss of control of the network and the consequences to safety and reliability.

The proposed program is consistent with the National Electricity Rules Capital Expenditure Objectives as the expenditure is required to maintain the quality, reliability, and security of supply of standard control services and maintain the safety of the distribution system.

4.1 Strategic alignment

The “Power and Water Corporation Strategic Direction” is to meet the changing needs of the business, our customers and is aligned with the market and future economic conditions of the Northern Territory projected out to 2030.

This proposal aligns with Asset Management System Policies, Strategies and Plans that contributes to the D2021/260606 “PWC Strategic Direction” as indicated in the table below.

Table 4 Alignment with corporate strategic focus areas

Strategic direction focus area		Strategic direction priority
1	Customer and the community at the centre	Improve Public Health and Safety
2	Always Safe	Cost Prudence

4.2 Dependent projects

There are no known projects or other network issues that are dependent on the resolution of this network issue.

4.3 Deliverability

This is a low-cost project that relies on standard skills and business as usual tasks. We consider that this project is deliverable.

4.4 Customer considerations

As required by the AER’s Better Resets Handbook, in developing this program Power Services has taken into consideration feedback from its customers.

Feedback received through customer consultation undertaken at the time of writing this PBC, has demonstrated strong support amongst the community for appropriate expenditure to enable long term maintenance of the network to ensure continued reliability, maintainability and safety of supply.

4.5 Expenditure profile

Table 5 shows a summary of the expenditure requirements for Regulatory Period 2025-29 and financial evaluation metrics, respectively.

Table 5 Annual capital and operational expenditure (\$'000, real FY22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	-	-	874	-	-	874
Opex	-	-	-	-	-	-
Total	-	-	874	-	-	874

4.6 High-level scope

Establish the new communications equipment at each end of the communications link and provision of a Lambda service from an alternative communications supplier. The Telstra communications link could be retained as back up.

Appendix A. Cost estimation

The cost of this project has been developed based on a bottom up build as shown below.

Table 6 Breakdown of cost estimate (\$000s real 2021/22)

Description			
Equipment (material/stores)			
MPLS Router Chassis (SAR-18)	█	█	█
MPLS Router OS License (SAR-18)	█	█	█
MPLS Router Control Switch Module (SAR-18)	█	█	█
MPLS Router Fan Module (SAR-18)	█	█	█
MPLS Router NSP License (SAR-18)	█	█	█
MPLS Router 2-Port 10GigE Ring Card (SAR-8/SAR-18)	█	█	█
MPLS Router 8-Port GigabitEthernet Card (SAR-8/SAR-18)	█	█	█
MPLS Router 6-Port Ethernet 10Gbps Card (SAR-8/SAR-18)	█	█	█
MPLS Router 10GBASE-ER XFP (40 km, 1550 nm) (SAR-8/SAR-18)	█	█	█
MPLS Router 10GBASE-LW/LR XFP (10 km, 1310 nm) (SAR-8/SAR-18)	█	█	█
MPLS Router 1000BASE-EX SFP (40 km, 1310 nm) (SAR-8/SAR-18)	█	█	█
MPLS Router 1000BASE-LX SFP (10 km, 1310 nm) (SAR-8/SAR-18)	█	█	█
MPLS Router 1000BASE-SX SFP (5 km, 850 nm) (SAR-8/SAR-18)	█	█	█
MPLS Router 10/100/1000BASE-TX (SAR-8/SAR-18)	█	█	█
Direct Costs			
EMS configuration costs (refer VTAN tab)	█	█	█
D&C contract for the detailed design and installation works	█	█	█
Vocus installation cost	█	█	█
Vocus ongoing monthly cost	█	█	█
Indirect Costs (Internal Labour)	█	█	█
Total			█

Appendix B. Compliance requirements

Power and Water is required to maintain the communications network to ensure compliance with a number of legislative requirements. This is consistent with the principles of the Risk Quantification Procedure, and while there are legislated penalties for non-compliance, we have considered compliance in a qualitative manner.

The relevant Legislation, Regulation and Codes include:

- Electricity Reform Act 2000
- Network Licence (varied 15 May 2020)
- National Electricity (NT) Rules (NT NER)
- Network Technical Code and Network Planning Criteria (Network Technical Code)
- System Control Technical Code

The key clauses that relate to the provision of communications systems are:

- The System Control Technical Code Clause 6.18(a) requires System Participants (the definition includes Power and Water as the network operator) to provide control and monitoring, alarms and measurements to the Power System Controller's SCADA system via communication links.
- The Network Technical Code Clauses 3.2.6 and 3.3.6.2 define the communications links between a User (generator or load) and the control centre (System Control) to be the responsibility of the Network Operator (Power Services).
- The Network Licence Clause 10 requires Power and Water to comply with all applicable provisions of the System Control Technical Code and the Network Technical Code.
- The Electricity Reform Act 2000 Clause 31 provides a maximum penalty of 2,500 penalty units for contravening the licence conditions. A penalty unit is worth 157 in FY22⁵, providing a maximum penalty of 392,500 per contravention.

There are clear legislative and government requirements for Power and Water to maintain a modern communications system and that the requirements are expected to become more stringent within the next few years with the introduction of the proposed Critical Infrastructure Bill. Decisions made on the technology and asset types installed now must provide real options⁶ for providing the cyber security capability and technology compatibility required in the near future.

⁵ <https://justice.nt.gov.au/attorney-general-and-justice/units-and-amounts/penalty-units>

⁶ Regulatory Investment Test for Distribution, Application Guidelines, December 2018, Australian Energy Regulator, Section 3.2.3

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