



Maintaining Reliability of Supply to the Atherton Tablelands and Cairns Areas Project Specification Consultation Report



Preface

Powerlink Queensland is a Transmission Network Service Provider (TNSP) that owns, develops, operates and maintains Queensland's high-voltage electricity transmission network. The network transfers bulk power from Queensland generators to electricity distributors Energex and Ergon Energy (part of the Energy Queensland Group), and to a range of directly connected large industrial customers.

This Project Specification Consultation Report has been prepared in accordance with version 244 of the National Electricity Rules (NER), and the Regulatory Investment Test for Transmission (RIT-T) [Instrument](#) (November 2024) and RIT-T [Application Guidelines](#) (November 2024). The RIT-T Instrument and Application Guidelines are published and administered by the Australian Energy Regulator (AER).

The NER requires Powerlink to carry out forward planning to identify future reliability of supply requirements, which may include replacement of network assets or augmentations of the transmission network. Powerlink must then identify, evaluate and compare network and non-network options (including, but not limited to, generation and demand side management) to identify the preferred option which can address future network requirements at the lowest net cost to electricity customers.

Powerlink also has obligations under the NER to address power system security requirements identified by the Australian Energy Market Operator in its annual [System Security Reports](#).

This document provides details of the risks and needs associated with this project. The document also encourages submissions from potential proponents of feasible non-network options to address the identified need. It also invites comment from customers, stakeholders and communities on the options presented.

More information on how Powerlink applies the RIT-T process is available on Powerlink's [website](#).

A copy of this report will be made available to any person within three business days of a request being made. Requests should be directed to the Manager Network and Alternate Solutions by phone (07 3860 2111) or email (networkassessments@powerlink.com.au).

Disclaimer

While care was taken in preparation of the information in this document, and it is provided in good faith, Powerlink accepts no responsibility or liability (including without limitation, liability to any person by reason of negligence or negligent misstatement) for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it, except to the extent that liability under any applicable Queensland or Commonwealth of Australia statute cannot be excluded. Powerlink makes no representation or warranty as to the accuracy, reliability, completeness or suitability for particular purposes, of the information in this document.

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular, the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

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Executive Summary

Powerlink has identified the need to maintain reliability of supply to the Atherton Tablelands and Cairns areas due to the deteriorating condition and obsolescence of key transmission network assets currently providing electricity services to these areas.

Key transmission network assets impacting reliability

Chalumbin 275/132kV Substation

Chalumbin Substation is located almost 100 kilometres (km) south of Cairns in Far North Queensland (FNQ) and has both 275 kilovolt (kV) and 132kV operating voltages. The site was established in 1988 to help supply load into the Cairns and Atherton Tablelands areas and it also provides the connection point for Kareeya Hydro Power Station. Planning studies confirm there is a long-term requirement to continue to supply the existing electricity services provided by this substation.

Selected 275kV and 132kV primary plant and secondary systems at Chalumbin Substation have been identified as being in poor condition or at the end of their technical service lives, with identified obsolescence issues. The condition of the substation's remaining original primary plant – the equipment through which the electrical power passes – has significantly deteriorated, with a high number of associated defects and obsolescence issues, increasing the risk to supply to connected customers.

Secondary systems are the control, protection and communications equipment that are necessary to operate the transmission network and prevent damage to primary systems when faults on the network occur. Many of the secondary systems at Chalumbin Substation are nearing the end of their technical service lives and have become or are becoming obsolete. They are no longer supported by the manufacturer and have only limited, or no, spares available. Under the National Electricity Rules (NER), Powerlink is required to provide sufficient secondary systems, including redundancies, to ensure the transmission system is adequately protected.

Chalumbin to Turkinje 132kV transmission line

The Chalumbin to Turkinje 132kV transmission line was established in 1986 and consists of 219 towers along a 100km corridor. It is a double circuit 132kV steel tower transmission line operating in an aggressive tropical environment. In particular, the most northerly section (12km from Turkinje Substation) and southerly section (15km from Chalumbin Substation) of the line have been identified to have consistently higher levels of corrosion, increasing the risk of supply to the Turkinje area.

Planning studies confirm there is an enduring need to maintain the supply of electricity currently provided by this transmission line to the Turkinje area.

Maintaining reliability of supply to the Atherton Tablelands and Cairns areas

The condition and obsolescence of key transmission network assets currently providing electricity services to the Atherton Tablelands and Cairns areas present Powerlink with a range of reliability of supply, safety and compliance risks.

Powerlink must therefore take action to:

- avoid the increasing likelihood of loss of power supply arising from failure of the aging equipment at Chalumbin substation and corrosion on the Chalumbin to Turkinje 132kV transmission line; and
- ensure customers are provided with a reliable and safe supply of electricity.

Powerlink is required to apply the Regulatory Investment Test for Transmission

The estimated capital cost of the most expensive credible option to maintain reliability of supply to the Atherton Tablelands and Cairns areas meets the minimum threshold (currently \$8 million) to apply the Regulatory Investment Test for Transmission (RIT-T). As the identified need for the proposed investment is to meet reliability and service standards specified within Powerlink’s Transmission Authority, guidelines and standards published by AEMO, and Powerlink’s ongoing compliance with Schedule 5.1 of the NER, it is classified as a reliability corrective action under the NER. The preferred option may therefore have a net economic cost.

Powerlink has developed a non-credible base case against which to compare credible options

Powerlink has modelled a non-credible option where the asset condition issues are managed via operational maintenance or operational measures only. This would result in an increase in overall risk levels due to continuing deterioration of asset condition and increasing failure rectification timeframes due to obsolescence issues. These increasing risk levels are assigned a monetary value to form the base case.

Powerlink has developed two credible network options to address the identified need

The table below details the credible network options and shows the capital cost breakdown for each option. Both options address the identified condition issues by replacement of assets. The difference is that Option 1 brings forward the replacement of the secondary systems at Chalumbin to realise efficiencies by coordinating this work with the primary plant replacement, with all work completed by 2030. These efficiencies have been reflected in the reduced capital cost for the secondary systems in Option 1. Option 2 addresses the identified condition issues by replacing assets in line with the asset need timing resulting in a staged project completed by 2034. No material change in operating and maintenance costs result from either investment option.

Summary of Credible Network Options

Option	Description	Breakdown of Capital Costs (\$m, 2026)	Total Capital Cost (\$m, 2026)
1	Undertake targeted work to extend the life of the Turkinje to Chalumbin 132kV transmission lines by 2027.	17.5	74.1
	Replace selected 275kV and 132kV primary plant by 2030.	46.7	
	Replace selected 275kV and 132kV secondary systems utilising the existing control building in conjunction with the primary plant replacement works by 2030.	9.9	
2	Undertake targeted work to extend the life of the Turkinje to Chalumbin 132kV transmission lines by 2027.	17.5	86.5
	Replace selected 275kV and 132kV primary plant by 2029.	46.7	
	Replace selected 275kV and 132kV secondary systems utilising the existing control building by 2034.	22.3	

Note: Total costs exclude risk and contingency.

Powerlink welcomes the potential for non-network options to form part or all of the solution

To enhance engagement outcomes, Powerlink proactively applies an engagement strategy to each RIT-T consultation. The scope of engagement activities undertaken is dependent upon various considerations, such as the characteristics and complexity of the identified need and potential credible options outlined in the [RIT-T stakeholder engagement matrix](#).

It is not considered likely that a non-network solution could fully offset the need for this investment. This is because Chalumbin Substation forms a critical part of the 275kV transmission network supplying FNQ and provides the primary connection point for Kareeya Hydro Power Station, which is also required to support system strength.

A non-network solution may be able to partially offset the investment by supplying, for example, the 132kV load at Turkinje Substation (i.e. Atherton Tablelands to Cooktown). To achieve this, the solution would need to supply over 90 megawatts (MW) of delivered demand (150MW underlying demand) and more than 1,700 megawatt hours (MWh) delivered demand (2,250MWh underlying demand) per day on a continuous basis. It would also be required to provide a stable frequency reference and voltage control to support local generation and energy storage systems. Importantly, the solution must meet reliability requirements such that, under a credible contingency, Turkinje Substation would not experience a loss of supply.

Powerlink welcomes submissions from proponents who consider they can offer a non-network option that is both technically and economically feasible on an ongoing basis.

Lodging a submission with Powerlink

Powerlink seeks written submissions on this Project Specification Consultation Report (PSCR), on or before **Tuesday, 24th July 2026**, particularly on the credible options presented in this PSCR. Submissions should be addressed to:

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1. Introduction

1.1. Powerlink asset management and obligations

Powerlink's approach to asset management delivers value to customers and stakeholders by optimising whole of life cycle costs, benefits and risks, while ensuring compliance with relevant legislation, regulations and standards. This is underpinned by Powerlink's corporate risk management framework, risk assessment guidelines and methodologies.

1.2. Overview of the Regulatory Investment Test for Transmission

The purpose of a Regulatory Investment Test for Transmission (RIT-T) is to identify the preferred investment option that meets the identified network need. The preferred option maximises the present value of economic benefits. If the identified need is for a reliability corrective action, the preferred option may have a net economic cost.¹

Powerlink applies the RIT-T to potential prescribed (regulated) investments in the transmission network where the estimated capital cost of the most expensive option exceeds \$8 million.²

This Project Specification Consultation Report (PSCR) is the first step in the RIT-T process.³ The PSCR:

- describes the reasons why Powerlink has determined that investment is necessary (the identified need), together with the assumptions used in identifying this need;
- provides potential proponents of non-network options with information on the technical characteristics that a non-network solution would need to deliver to assist proponents to consider whether they could offer an alternative solution;
- describes the credible option(s) that Powerlink currently considers may address the identified need and the estimated capital cost and completion date for each option;
- explains which (if any) categories of market benefit Powerlink expects to be material, or not material, for this RIT-T;
- describes how customers and stakeholders have been engaged with regarding the identified need; and
- provides stakeholders with the opportunity to comment on the credible option(s) presented.⁴

More information on the RIT-T process is provided in Appendix 1. Powerlink's compliance with RIT-T requirements in the National Electricity Rules (NER) and the RIT-T Application Guidelines is set out in Appendix 4.

1.3. Consumer and Non-network Engagement

Powerlink undertakes a considered and consistent approach to ensure an appropriate level of stakeholder engagement is undertaken for each individual RIT-T consultation. The scope of engagement activities is dependent upon various considerations, such as the characteristics and complexity of the identified need and potential credible options.

¹ National Electricity Rules (NER), clause 5.15A.1(c) and chapter 10, glossary ('net economic benefit').

² NER, clauses 5.15.3(a) and (b)(2) set the threshold at \$5 million. The Australian Energy Regulator's (AER) latest [cost threshold review](#) increased the value to \$8 million for three years from 1 January 2025.

³ This RIT-T consultation process has been prepared in accordance with clauses 5.16.4(b) to (g) of the National Electricity Rules and AER, *Regulatory Investment Test for Transmission Application Guidelines*, November 2024.

⁴ NER, clause 5.16.4(b).

For all RIT-Ts, members of Powerlink’s Non-network Engagement Stakeholder Register receive email notifications of publication of RIT-T reports. For projects where Powerlink identifies material or significant market benefits, additional activities such as webinars or dedicated engagement forums may be appropriate. For more information, see Powerlink’s [RIT-T stakeholder engagement matrix](#).

Additionally, Powerlink takes a proactive approach to engagement generally. This includes:

- the Transmission Network Forum – Powerlink’s annual customer engagement event.
- collaboratively working with Powerlink’s customers, including regular consultation on RIT-Ts with our Customer Panel ([Powerlink Customer Panel | Powerlink](#)).
- transparency on future networks, such as our Transmission Annual Planning Report (TAPR)

Appendix 2 provides more detail on Powerlink’s engagement approach.

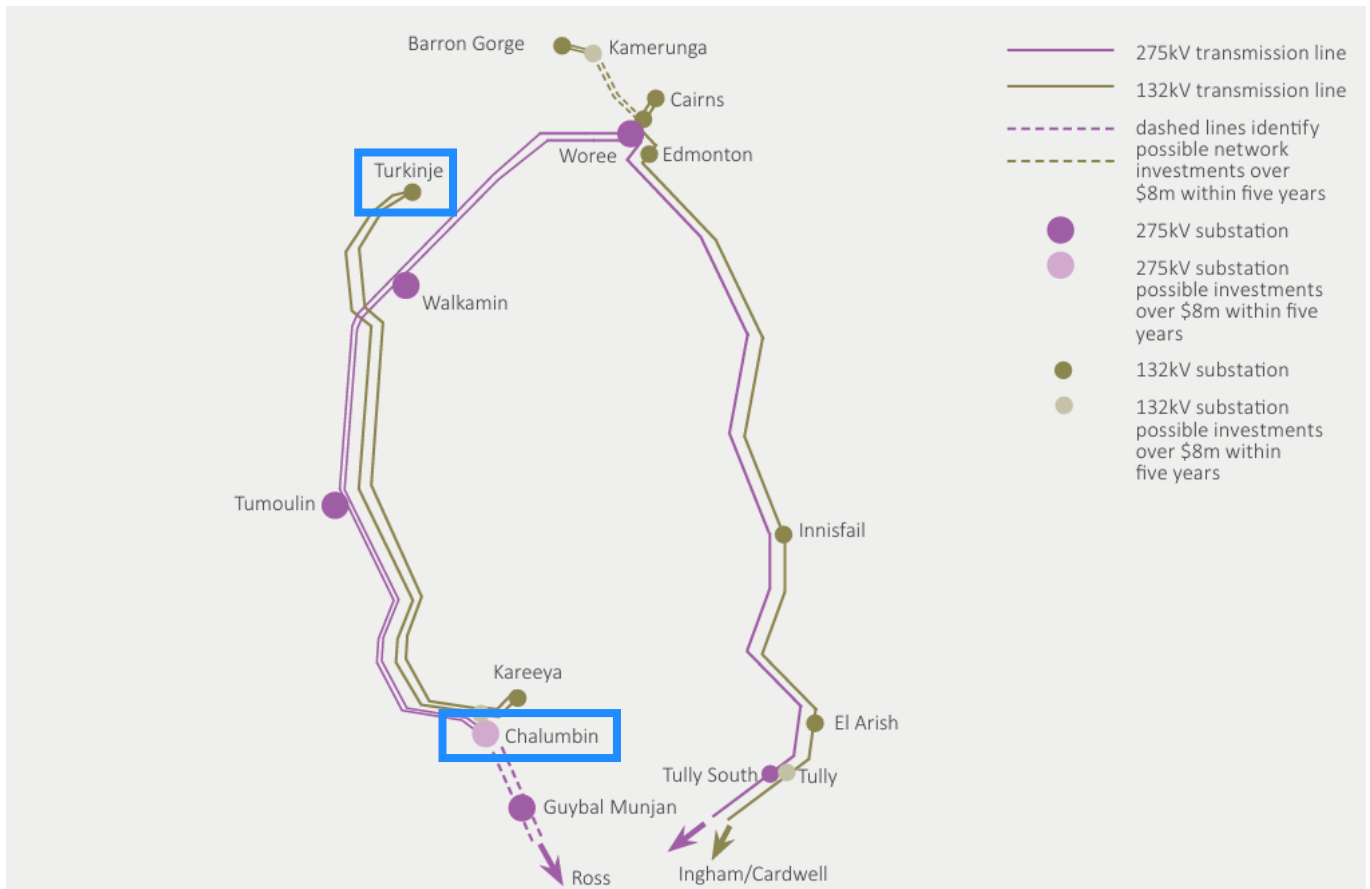
2. Identified Need

The primary driver is plant reliability leading to an in-service failure of one or more elements of Powerlink’s transmission network. This would result in the need to replace the failed element under emergency conditions, as well as the loss of load to the Atherton Tableland and Cairns areas.

2.1. Geographical and network need

Chalumbin Substation is located almost 100 kilometres (km) south of Cairns in Far North Queensland (FNQ) and has both 275 kilovolt (kV) and 132kV operating voltages. The site was established in 1988 to help supply load into the Cairns and Atherton Tablelands areas and it also provides the connection point for Kareeya Hydro Power Station. The Chalumbin to Turkinje 132kV double circuit transmission lines were established in 1986 to provide supply to the Atherton Tablelands. They are approximately 100km long and connect from Chalumbin through to the Turkinje substation. Figure 2.1 provides an overview of Powerlink’s network in the Chalumbin and Turkinje region.

Figure 2.1: Far North Zone Transmission Network



2.2. Description of identified need

Powerlink’s Transmission Authority requires it to plan and develop the transmission network in accordance with good electricity industry practice, having regard to the value that end users of electricity place on the quality and reliability of electricity services. It allows load to be interrupted during a critical single network contingency, provided the maximum load and energy will not exceed 50 megawatts (MW) at any one time, or will not be more than 600 megawatt hours (MWh) in aggregate.⁵ The Transmission Authority is also subject to a broader obligation under the *Electricity Act 1994* (Qld) (the Electricity Act) that Powerlink operate, maintain (including repair and replace if necessary) and protect its transmission grid to ensure the adequate, economic, reliable and safe transmission of electricity.⁶

Planning studies confirm that the services currently provided by Chalumbin Substation and the 132kV double circuit transmission lines between Chalumbin and Turkinje are required into the foreseeable future to meet ongoing customer requirements.

⁵ Transmission Authority No. T01/98, section 6.2(c).

⁶ *Electricity Act 1994* (Qld), section 34(1)(a).

Secondary systems are used to control, monitor, protect and secure communication to facilitate safe and reliable network operation.⁷ Schedule 5.1 of the NER sets minimum standards for network service providers on the availability and operation of protection systems. Schedule 5.1.9(c) specifically requires Powerlink provide sufficient primary and back-up protection systems (including breaker fail protection systems) to ensure that a fault anywhere on the transmission system is automatically disconnected.⁸

Protection systems are also important for maintaining power transfer following a credible contingency event, such as the disconnection of a generating unit or transmission line. Powerlink is required to ensure that all protection systems for lines at voltages above 66kV, are well maintained so as to always be available other than for periods not greater than eight hours while maintenance of a protection system is being carried out.⁹

AEMO's [Power System Security Guidelines](#) and [Power System Data Communication Standard](#) require Powerlink to be able to safely resolve all protection, remote control and monitoring system problems and defects within 24 hours.

Selected primary plant and secondary systems at Chalumbin Substation have been identified as being in poor condition or at the end of their technical service lives. They have become or are becoming obsolete, where they are no longer supported by the manufacturer and have only limited, or no, spares available.

Additionally, the 132kV double circuit transmission line between Chalumbin Substation and Turkinje Substation is exhibiting high levels of corrosion on the towers in the most northerly and southerly sections of the line (12km from Turkinje substation and 15km from Chalumbin substation), increasing risk of component failure and the risk to supply.

Powerlink must therefore act to avoid the increasing likelihood of loss of power arising from failure of these network components and to ensure customers are provided with a reliable and safe supply of electricity.

The proposed investment is for meeting reliability and service standards are set through Powerlink's Transmission Authority requirements and Schedule 5.1 of the NER. The investment is therefore classed as a reliability corrective action under the NER.¹⁰ A reliability corrective action differs from that of an increase in producer and consumer surplus (market benefit) driven need in that the preferred option may have a negative net economic outcome because it is required to meet an externally imposed obligation on the network business.¹¹

2.3. Consequence of failure of primary plant and transmission line assets

Poor asset condition increases the risk and frequency of faults, while obsolescence, site constraints and location increase the time needed for Powerlink to undertake any necessary repairs, prolonging the return to service time. The potential in-service failure of ageing primary plant at Chalumbin Substation and the transmission line assets supplying Turkinje Substation presents Powerlink with a range of unacceptable safety, network, environmental and financial risks, and the inability to meet legislative obligations and customer service standards. The condition and consequences of failure of the main at-risk items of equipment is summarised in the table below.

⁷ NER, Schedule 5.1.

⁸ NER, Schedule 5.1.9(c).

⁹ NER, Schedule 5.1.2.1(d).

¹⁰ NER, clause 5.10.2 (definition of 'reliability corrective action').

¹¹ NER, clause 5.15A.1(c).

Table 2.1: Summary of primary equipment condition issues and potential consequences of failure

Equipment	Condition / Issue	Potential Consequences of Failure
Circuit Breakers	<ul style="list-style-type: none"> • Obsolescence and limited availability of spares; no longer supported by the manufacturer. • Loss of pneumatic pressure • SF6 Leaks 	<ul style="list-style-type: none"> • Failure to operate to clear a fault, resulting in slower clearance times and additional plant being taken out of service to clear the fault, increasing supply risk. • Extended time to restore supply to customers due to a limited availability of spares • Environmental impacts from Sulfur Hexafluoride (SF₆) gas release • Financial impacts due to cost premium to replace during an emergency • Increased maintenance resulting in less reliable and more costly supply to customers
Voltage Transformers	<ul style="list-style-type: none"> • Degraded oil and paper insulation inside porcelain housings • Oil leaks and overheating 	<ul style="list-style-type: none"> • Potential safety impacts to field personnel working in the vicinity when failure occurs • Financial impacts due to cost premium to replace during an emergency and potential damage to neighbouring plant • Loss of protection signals resulting in disconnection of supply
Current Transformers	<ul style="list-style-type: none"> • Degraded oil and paper insulation inside porcelain housings • Oil leaks 	<ul style="list-style-type: none"> • Potential safety impacts to field personnel working in the vicinity when failure occurs • Financial impacts due to cost premium to replace during an emergency and potential damage to neighbouring plant • Loss of protection signals resulting in disconnection of supply
Surge Arrestors	<ul style="list-style-type: none"> • Moisture ingress • Corrosion • Dielectric breakdown 	<ul style="list-style-type: none"> • Unable to protect equipment from overvoltage surges resulting in failure of downstream equipment
Transmission Towers	<ul style="list-style-type: none"> • Corrosion 	<ul style="list-style-type: none"> • Tower failure resulting in potential safety impacts and extended outages • Financial impacts due to cost premium to replace during an emergency and potential damage to neighbouring towers

2.4. Secondary System Condition and Risks

The duration of a fault in the secondary systems is not only dependent on the nature and location of the fault, but also on the availability of a like-for-like replacement of the failed component. If a like-for-like replacement is available (i.e. same hardware and firmware as the failed device), then the replacement is often not complex and can generally be rectified within the timeframes specified by AEMO. If a like-for-like replacement is not available, then replacement is operationally and technically more complex due to:

- physical differences with the mounting and installation;
- development and testing of new configurations and settings;

- cabling, connectivity and protocol differences;
- interoperability between other devices on site, and with remote ends (if applicable);
- non-standard settings / configuration requirements; and
- legislative requirements for professional engineering certification.

All of the above complexities add time to fault resolution, typically resulting in a fault duration well in excess of the required 24 hours.

Given the specific nature of the NER obligations and the AEMO requirements relating to protection, control and monitoring systems, accepted good industry practice is to replace the ageing and obsolete secondary systems at the end of their technical service lives, rather than running to failure. Due to the condition and obsolescence issues with the secondary systems at Chalumbin Substation, there is a risk of breaching these mandated obligations and requirements if the secondary systems are left to operate beyond their expected service life. A summary of the equipment condition issues and associated potential consequences of failure of the equipment is shown in the table below.

Table 2.2: Summary of secondary systems equipment condition issues and potential consequences of failure

Equipment	Condition / Issue	Potential Consequences of Failure
Protection and Control for High Voltage Bay	<ul style="list-style-type: none"> • Obsolescence and limited availability of spares; no longer supported by the manufacturer. • Increasing failure rates due to ageing electronic components. 	<ul style="list-style-type: none"> • Failure to operate to clear a fault, resulting in slower clearance times and additional plant being taken out of service to clear the fault, increasing supply risk. • Prolonged outages of equipment placing load at risk and resulting in less reliable supply to customers. • Unable to comply with Power System Data Communication Standard. • Unable to comply with the Power System Security Guidelines. • Increased failures resulting in less reliable supply to customers.
SCADA System	<ul style="list-style-type: none"> • Obsolescence and limited availability of spares; no longer supported by the manufacturer. • Increasing failure rates due to ageing electronic components. 	<ul style="list-style-type: none"> • Unable to comply with the Power System Security Guidelines. • Increased failures resulting in less reliable supply to customers.

In addition to the site-specific impacts of obsolescence at Chalumbin Substation, it is also important to note the compounding impact of equipment obsolescence occurring across the fleet of secondary systems assets installed in the Powerlink network. When a particular equipment type or model is no longer supported by the manufacturer, and limited spares are available to service the fleet of assets, running multiple secondary systems to failure across the network increases the likelihood of concurrent systemic faults. This could overwhelm Powerlink’s capacity to undertake corrective maintenance or replacement projects. This could leave Powerlink in breach of the NER, the AEMO standards and jurisdictional obligations.

3. Required Technical Characteristics for Non-network Options

The information provided in this section is intended to enable interested parties to formulate and propose genuine and practicable non-network solutions such as, but not limited to, local generation and demand side management initiatives.

Powerlink welcomes submissions from proponents who consider that they could offer a non-network solution in full or in part by 2030 for the aging equipment at Chalumbin Substation and 2027 for the transmission line, on an ongoing basis and will investigate the feasibility of any potential non-network option proposed or otherwise identified.

3.1. Criteria for proposed network support services

It is not considered likely that a non-network solution could fully offset the need for this investment. Chalumbin Substation forms a critical part of the 275 kV transmission network supplying FNQ and provides the primary connection point for Kareeya Hydro Power Station, which is also required to support system strength.

A non-network solution may be able to partially offset the investment by supplying, for example, the 132kV load at Turkinje Substation (i.e. Atherton Tablelands to Cooktown). To achieve this, the solution would need to supply over 90MW of delivered demand (150MW underlying demand) and more than 1,700 MWh delivered demand (2,250MWh underlying demand) per day on a continuous basis. It would also be required to provide a stable frequency reference and voltage control to support local generation and energy storage systems. Importantly, the solution must meet reliability requirements such that, under a credible contingency, Turkinje Substation would not experience a loss of supply.

Powerlink has identified the following common criteria that must be satisfied if proposed network support services are to meet supply requirements.¹²

Size and location

- Proposed solutions must be large enough, individually or collectively, to provide the size of injection or demand response set out above. However, the level of support is dependent on the location, type of network support and load forecasts.
- Due to the bulk nature of the transmission network, aggregation of sub 10MW non-network solutions will be the sole responsibility of the non-network provider.
- Notwithstanding the location of any solution, each proposal would require assessment in relation to technical constraints pertinent to the network connection, such as impacts on intra-regional transfer limits, fault level, system strength, maintaining network operability and quality of supply.

Operation

- A non-network option would need to be capable of operating continuously 24 hours per day over a period of years.
- If a generation service is proposed (either standalone or in conjunction with other services), such operation will be required regardless of the market price.¹³

¹² Powerlink's [Network Support Contracting Framework](#) provides a general guide to assist potential non-network solution providers. This framework outlines the key contracting principles that are likely to appear in any network support agreement.

¹³ NER, clause 3.9.7 prevents a generator that is providing network support from setting the market price.

- Proponents of generation services are advised that network support payments are intended for output that can be demonstrated to be additional to the plant's normal operation in the National Electricity Market (NEM).
- Where there are network costs associated with a proposed non-network option, including asset decommissioning, these costs form part of the scope of a non-network option and will be included in the overall cost of a non-network option as part of the RIT-T cost-benefit analysis.

Reliability

- Proposed services must be capable of reliably meeting electricity demand under a range of conditions and, if a generator, must meet all relevant NER requirements related to grid connection.
- Powerlink has obligations under the NER, its Transmission Authority and connection agreements to ensure supply reliability is maintained to its customers. Failure to meet these obligations may give rise to liability. Proponents of non-network options must also be willing to accept any liability that may arise from its contribution to a reliability of supply failure.

Timeframe and certainty

- Proposed services must be able to be implemented in sufficient time to meet the identified need, using proven technology and, where not already in operation, provision of information in relation to development status such as financial funding and development timeline to support delivery within the required timeframe must be provided.

Duration

- The agreement duration for any proposed service will provide sufficient flexibility to ensure that Powerlink is pursuing the most economic long run investment to address the condition risks.

Powerlink welcomes submissions from potential proponents who consider that they could offer a credible non-network option that is both economically and technically feasible.

4. Potential Credible Network Options to Address the Identified Need

Powerlink has developed two credible network options to maintain reliability of supply to the Atherton Tablelands and Cairns areas. A summary of these options, including the capital cost breakdown and completion dates, is shown in the table below. Both options address the identified condition issues by replacement of assets. The difference is that Option 1 brings forward the replacement of the secondary systems at Chalumbin to realise efficiencies by coordinating this work with the primary plant replacement, with all work completed by 2030. These efficiencies have been reflected in the reduced capital cost for the secondary systems in Option 1. Option 2 addresses the identified condition issues by replacing assets in line with the asset need timing resulting in a staged project completed by 2034. No material change in operating and maintenance costs result from either investment option.

Table 4.1: Summary of credible options

Option	Description	Breakdown of Capital Costs (\$m, 2026)	Total Capital Cost (\$m, 2026)
1	Undertake targeted work to extend the life of the Turkinje to Chalumbin 132kV transmission lines by 2027.	17.5	74.1
	Replace selected 275kV and 132kV primary plant by 2030.	46.7	
	Replace selected 275kV and 132kV secondary systems utilising the existing control building in conjunction with the primary plant replacement works by 2030.	9.9	
2	Undertake targeted work to extend the life of the Turkinje to Chalumbin 132kV transmission lines by 2027.	17.5	86.5
	Replace selected 275kV and 132kV primary plant by 2029.	46.7	
	Replace selected 275kV and 132kV secondary systems utilising the existing control building by 2034.	22.3	

Each credible option addresses the identified risks by the replacement of deteriorated equipment. This allows Powerlink to meet its reliability of supply and safety obligations under its Transmission Authority, the Electricity Act and Schedule 5.1 of the NER.

Powerlink does not consider that any of the credible options being considered will have a material inter-network impact, based on AEMO’s screening criteria.¹⁴

5. Economic Analysis of the Base Case

Powerlink has developed a monetised risk modelling framework consistent with the RIT-T Application Guidelines. An overview of the framework is available on Powerlink’s [website](#) and the principles of the framework have been used to calculate the monetised risk, termed risk costs, in the NEM context for the base case for this RIT-T. The framework includes the modelling methodology and general assumptions underpinning the analysis.

5.1. Modelling a base case under the RIT-T

The base case is the situation in which the RIT-T proponent does not implement a credible option to meet the identified need and continues with business-as-usual (BAU) activities.¹⁵

The assessment undertaken in this RIT-T compares the costs and benefits of credible options to address the risks arising from this need with a base case. As characterised in the RIT-T Application Guidelines, the base case reflects

¹⁴ NER, clause 5.16.4(b)(6)(ii). AEMO has published [guidelines](#) for assessing whether a credible option is expected to have a material inter-network impact.

¹⁵ AER, *Regulatory Investment Test for Transmission*, November 2024, glossary (‘base case’).

a situation in which the condition and obsolescence issues arising from the ageing assets are only addressed through standard operational activities, with resultant safety, financial, environmental and network risks.¹⁶

To develop the base case, the existing condition and obsolescence issues are managed by undertaking operational maintenance or operational measures only. This results in increasing levels of risk as the condition and availability of the asset deteriorates over time. These risk levels are assigned a monetary value that is used to evaluate the credible options designed to offset or mitigate these risk costs.

The base case therefore includes the costs of work associated with operational maintenance where material and the risk costs associated with the failure of the assets. The costs associated with equipment failures are modelled in the risk cost analysis and are not included in the operational maintenance costs.

The base case acts as a benchmark and provides a reference point in the cost-benefit analysis to compare and rank the credible options against each other over the same timeframe.

6. Cost Estimation

Basis of Estimation

The basis for the estimation for the credible options presented in this PSCR is outlined in the methodologies and processes used to derive cost estimates as described in Powerlink's Cost Estimation Methodology. The estimates are informed by the level of specific project information available at the time of PSCR preparation. Powerlink's Cost Estimation Methodology also provides context to the classes of estimate discussed in this section.¹⁷

Key inputs and assumptions

Class 5 Concept Estimates have been produced for Options 1 and 2, with an accuracy range of -50% to +100%. Powerlink has made the following assumptions in producing the estimates:

- All existing equipment in good condition and working order, the site is accessible and there are no Restricted Access Zones;
- All resources will be available including necessary resources to complete design, construction, testing and commissioning activities;
- Availability of site access for works as required;
- Existing ground conditions are suitable for the construction of standard foundations;
- Laydown area is located within the substation yard;
- Outages will be available based on appropriate contingency arrangements being put in place to ensure Return to Service requirements are met;
- Primary and secondary system equipment is available within current agreed lead times;
- Existing access tracks are in good condition and do not require upgrading; and
- Site works shall be contained within existing sites, tower pads and previously disturbed areas.

¹⁶ AER, *Application Guidelines, Regulatory Investment Test for Transmission*, November 2024, page 21. See AER, *Regulatory Investment Test for Transmission*, November 2024, paragraph 24 and AER, *Application Guidelines, Regulatory Investment Test for Transmission*, November 2024, pages 32-35 for a definition and discussion of states of the world in a RIT-T.

¹⁷ The methodology is available on the [RIT-T Consultations](#) page of Powerlink's website.

7. Submission Requirements and Next Steps

Powerlink invites submissions and comments in response to this PSCR from Registered Participants, AEMO, potential non-network providers and any other interested parties.

This is not a tender process – submissions are requested so that Powerlink can fulfil its regulatory obligations to analyse non-network options. In the event that a non-network option appears to be a genuine and practicable alternative that could satisfy the RIT-T, Powerlink will engage with that proponent or proponents to confirm cost inputs and commercial terms.

7.1. Submissions from non-network providers

Submissions should be presented in a written form and should clearly identify the author of the submission, including contact details for subsequent follow-up if required. If parties prefer, they may request to meet with Powerlink ahead of providing a written response.

Submissions from potential non-network providers should contain the following information:

- details of the party making the submission (or proposing the service);
- technical details of the project (capacity, proposed connection point if relevant, etc.) to allow an assessment of the likely impacts on future supply capability;
- sufficient information to allow the costs and benefits of the proposed service to be incorporated in a comparison in accordance with AER's RIT-T Application Guidelines;
- an assessment of the ability of the proposed service to meet the technical requirements of the NER;
- timing of the availability of the proposed service; and
- other material that would be relevant in the assessment of the proposed service.

Powerlink will publish submissions on the PSCR, subject to any claim of confidentiality by the person making the submission. Where confidentiality over part or all of a submission is made, this should be clearly identified. Powerlink may also explore whether a redacted or non-confidential version of the submission can be made available.¹⁸

Powerlink has a general obligation to use all reasonable endeavours not to disclose any confidential information it receives. The obligation is subject to a number of exceptions, including that disclosure may be made:

- with the consent of the person providing the information; or
- to the AER, Australian Energy Market Commission or any other regulator having jurisdiction over Powerlink under the NER or otherwise.¹⁹

It should be noted that Powerlink is required to publish the outcomes of the RIT-T analysis. If parties making submissions elect not to provide specific project cost data for commercial-in-confidence reasons, Powerlink may rely on cost estimates from independent specialist sources.

7.2. Next steps

Powerlink intends to carry out the following process to assess what action, if any, should be taken to address future supply requirements.

¹⁸ AER, *Application Guidelines, Regulatory Investment Test for Transmission*, November 2024, page 70.

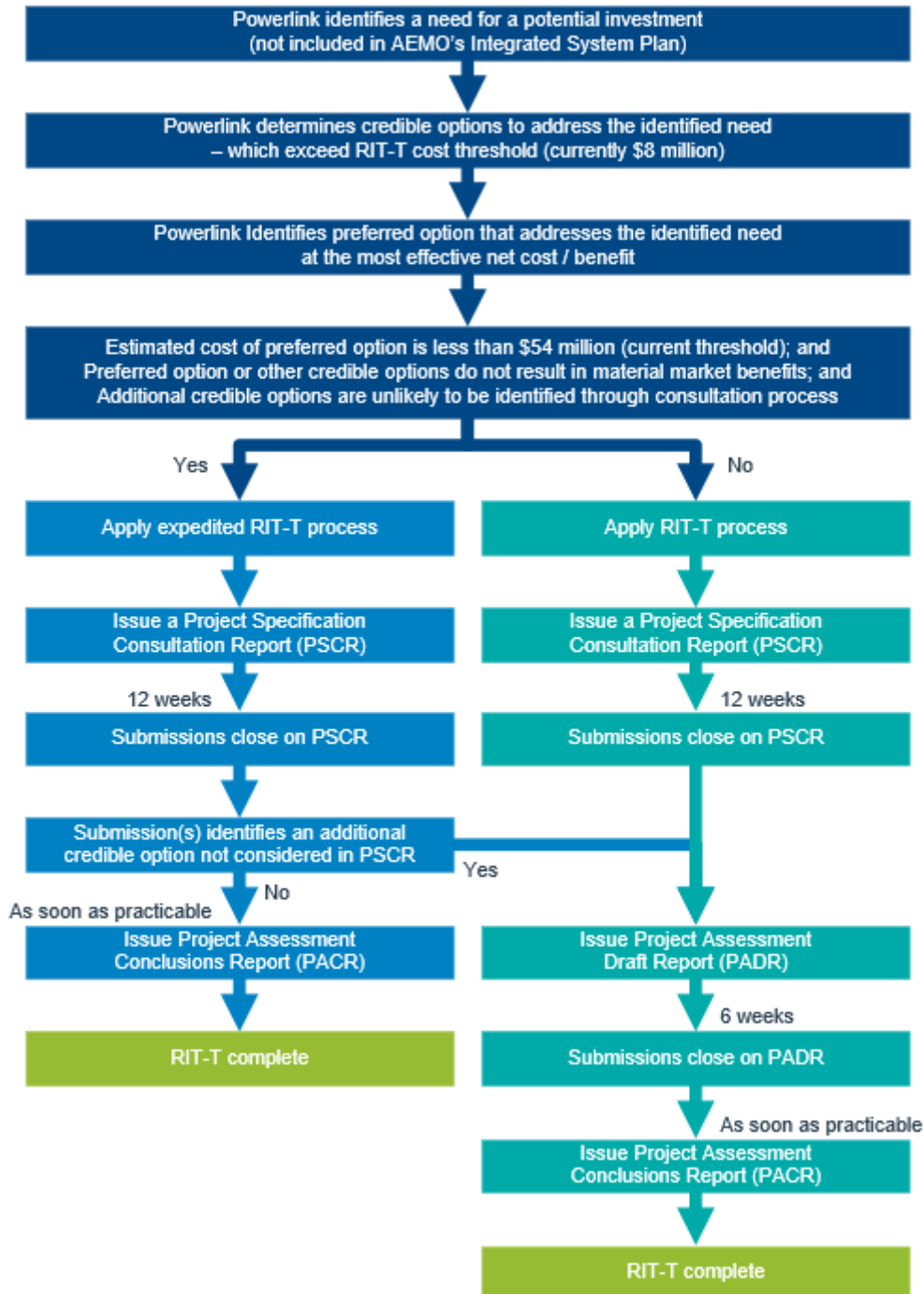
¹⁹ NER, rule 8.6.

Part 1	PSCR Publication	April 2026
Part 2	Submissions due on PSCR Have your say on the credible options and propose non-network options	24 th July 2026
Part 3	Publication of PADR	Mid-August 2026
Part 4	Submissions due on PADR	End September 2026
Part 5	Publication of PACR Powerlink’s response to any further submissions received and final recommendation on the preferred option for implementation	End October 2026

Powerlink reserves the right to amend the timetable at any time. Amendments to the timetable will be made available on the Powerlink website (www.powerlink.com.au/rit-t-consultations).

Appendix 1: RIT-T Process

The flow chart below illustrates the RIT-T process where the need is not identified as an actionable project in AEMO’s Integrated System Plan.



Appendix 2: Powerlink's Approach to Engagement

More than five million Queenslanders and 241,000 Queensland businesses depend on Powerlink's performance. Powerlink recognises the importance of engaging with a diverse range of customers and stakeholders who have the potential to affect, or be affected by, Powerlink activities and/or investments.

Together with our industry counterparts from across the electricity and gas supply chain, Powerlink has committed to the [Energy Charter](#). The charter is a national CEO-led collaboration that supports the energy sector towards a customer-centric future. Powerlink joins other signatories in committing to progress the culture and solutions needed to deliver more affordable, reliable and sustainable energy systems. Powerlink's [Energy Charter Disclosure Statement for 2024/25](#) shows Powerlink's achievements against the principles of the Energy Charter.

Powerlink takes a proactive approach to engagement

Powerlink regularly hosts a range of activities to provide timely and transparent information to customers and stakeholders within the broader community.

Powerlink's annual Transmission Network Forum (TNF) is a primary vehicle used to engage with the community, understand broader customer and industry views and obtain feedback on key topics. It also provides Powerlink with an opportunity to further inform its business network and non-network planning objectives. TNF participants include customers, landholders, environmental groups, Traditional Owners, government agencies, and industry bodies.

Engagement activities such as the TNF help inform the future development of the transmission network and assist Powerlink in providing services that align with the long-term interests of customers. Powerlink also incorporates feedback from these activities into a number of [publicly available reports](#).

Working collaboratively with Powerlink's Customer Panel

Powerlink's [Customer Panel](#) provides a face-to-face opportunity for customers and consumer representatives to give their input and feedback about Powerlink's decision-making, processes and methodologies. The panel also provides Powerlink with a valuable avenue to keep customers and stakeholders better informed, and to receive feedback about topics of relevance, including RIT-Ts.

The Customer Panel is regularly advised on the publication of Powerlink's RIT-T documents and is briefed quarterly on the status of current RIT-T consultations as well as upcoming RIT-Ts. This provides an ongoing opportunity for the Customer Panel to ask questions and provide feedback to further inform RIT-Ts, and for Powerlink to better understand the views of customers when undertaking the RIT-T consultation process.

Powerlink will continue to provide updates to and request input from the Customer Panel throughout the RIT-T consultation process.

Transparency on future network requirements

Powerlink's annual planning review findings are published in the [TAPR](#) and TAPR templates (available via the [TAPR portal](#)). It provides early information and technical data to customers and stakeholders on potential transmission network needs over a 10-year outlook period. The TAPR plays an important part in planning Queensland's transmission network and helping to ensure it continues to meet the needs of Queensland electricity customers and participants in the NEM.

Community engagement

Powerlink recognises the importance of engaging with stakeholders who may reasonably be expected to be affected by the works required to meet the identified need described in this RIT-T.

The engagement frameworks and strategies that underpin Powerlink's engagement approach include:

- The International Association for Public Participation (IAP2) spectrum²⁰, noting each stakeholder group has unique needs and requires an individual assessment on the spectrum;
- Powerlink's [Community Engagement Approach](#) and [Reflect Reconciliation Action Plan](#); and
- the Energy Charter [Landholder and Community Better Practice Engagement Guide](#); and [Better Practice Social Licence Guideline](#).

Powerlink assesses the requirement for community engagement based on the identified need

Powerlink undertakes an assessment of the potential for social and environmental impacts of anticipated replacement or augmentation projects well in advance of the identified need timing. Understanding if and when community engagement may be required, as well as the appropriate engagement approach, is an integral component of the early planning analysis needed to inform option identification, consideration of statutory processes (e.g. Ministerial Infrastructure Designation if required) and subsequent project development strategy and engagement plans.

Powerlink's engagement approach is tailored to maximise the accessibility of the proposed project's information to the stakeholder groups and/or communities affected by the project once the need to undertake community engagement is identified. Key stakeholders may include, but are not limited to, directly impacted and adjacent landholders, Traditional Owner groups, local residents, businesses and other organisations such as schools, community organisations and environmental groups, local government authorities and elected representatives within local and state governments.

Assessment and basis of assessment on the need for community engagement

Powerlink has assessed that minimal community engagement is required given the scope of works under consideration for any proposed network options to meet the identified need. This is due to all network options including replacement of equipment within the existing Chalumbin Substation and within the existing easement for the Chalumbin to Turkinje 132kV transmission line. Powerlink will engage with landowners and stakeholders where works or access to the works will impact their property. Powerlink will also provide notifications to nearby residents to ensure all affected parties are appropriately informed of project activities.

²⁰ Refer to IAP2's [website](#).

Appendix 3: Market benefits that are not material for this RIT-T assessment

A discussion of each market benefit under the RIT-T that Powerlink considers not to be material is presented below.

- **Changes in patterns of generation dispatch:** replacement of ageing assets under the credible options by itself does not affect transmission network constraints or affect transmission flows that would change patterns of generation dispatch. It follows that changes through different patterns of generation dispatch are not material to the outcome of the RIT-T assessment.
- **Changes in voluntary load curtailment:** replacement of ageing assets under the credible options by itself does not affect prices in the wholesale electricity market. It follows that changes in voluntary load curtailment will not be material for the purposes of this RIT-T.
- **Changes in costs for other parties:** the effect of replacement of ageing assets under the credible options considered are localised to the substation they are located at and do not affect the capacity of transmission network assets and therefore are unlikely to change generation investment patterns (which are captured under the RIT-T category of ‘costs for other parties’)
- **Differences in the timing of expenditure:** credible options for asset replacement do not affect the capacity of transmission network assets, the way they operate, or transmission flows. Accordingly, differences in the timing of expenditure of unrelated transmission investments are unlikely to be affected.
- **Changes in network losses:** credible options are not expected to provide any changes in network losses as the replacement and refit work does not materially affect the characteristics of primary transmission assets.
- **Changes in ancillary services cost:** there is no expected change to the costs of Frequency Control Ancillary Services (FCAS), Network Control Ancillary Services (NCAS), or System Restart Ancillary Services (SRAS) due to credible options under consideration. These costs are therefore not material to the outcome of the RIT-T assessment.
- **Changes in Australia’s greenhouse gas emissions:** Powerlink does not consider that any of the credible options will materially affect Australia’s greenhouse gas emissions, and the cost of quantifying any greenhouse gas emission benefits would involve a disproportionate level of effort compared to the additional insight it would provide.
- **Competition benefits:** Powerlink does not consider that any of the credible options will materially affect competition between generators, and generators’ bidding behaviour and, consequently, considers that the techniques required to capture any changes in such behaviour would involve a disproportionate level of effort compared to the additional insight it would provide.
- **Option value:** Powerlink does not consider that the identified need for the options considered in this RIT-T is affected by uncertain factors about which there may be more clarity in future. As a consequence, option value is not a relevant consideration for this RIT-T.
- **Costs associated with social licence activities:** Powerlink does not consider that the cost of social licence activities is materially different between the credible options under consideration in this RIT-T. These costs are therefore not material to the outcome of the RIT-T assessment.

Appendix 4: Compliance Checklists

NER Requirements for RIT-T

This appendix outlines Powerlink’s compliance with PSCR content requirements set out in sub-paragraphs (1) to (6) of clause 5.16.4(b) of the NER.

Table A4.1: NER Compliance Checklist

Sub-para	Requirement	Section of PSCR
(1)	Description of identified need	2
(2)	Assumptions used to identify the identified need	2
(3)	Technical characteristics of the identified need that a non-network option would be required to deliver	0
(4)	Discussion of identified need or credible options to meet the identified need in most recent Integrated System Plan	N/A
(5)	Description of credible options	4
(6)	For each credible option, information about:	
	(i) technical characteristics of the option;	4
	(ii) whether the option is reasonably likely to have a material inter-network impact;	4
	(iii) the classes of market benefit that are likely / not likely to be material	Appendix 3
	(iv) estimated construction timetable and commissioning date	4
	(v) indicative capital and operating and maintenance costs	4

N/A denotes not applicable.

RIT-T Application Guidelines Compliance Checklist

Table A4.2 outlines Powerlink’s compliance with binding requirements included in the RIT-T Application Guidelines.

Table A4.2: RIT-T Application Guidelines Compliance Checklist

Section of Guidelines	Topic	Requirements	Section of PSCR
3.2.5	Social licence principles	Consider social licence issues in the identification of credible options and include information about when and how social licence considerations have affected the identification and selection of credible options.	Appendix 2
3.4.3	Value of emissions reduction	The VER, reported in dollars per tonne of emissions (CO2 equivalent), is used to value emissions within a state of the world. A RIT-T proponent is required to use the then prevailing VER under relevant legislation or, otherwise, in any administrative guidance.	N/A
3.5	Valuing costs	<p>Costs are the present value of the following direct costs:</p> <ul style="list-style-type: none"> • Constructing or providing the credible option; • Operating and maintenance costs; • Costs of complying with relevant laws, regulations and administrative requirements; and <p>Costs of removing and disposing of existing assets (particularly for asset replacement programs).</p>	4
3.5.3	Social licence costs	Provide the basis for any social licence costs, including any reference to best practice	N/A
3.5A.1	Cost estimation accuracy	Outline cost estimation process (as applicable to stage of the RIT-T)	6
3.5A.2	Cost estimation information	Details of inputs, assumptions and methodologies for each credible option (as applicable to the stage of the RIT-T) ²¹	6
3.6	Market benefit classes	Apply market benefit classes consistently across all credible options	N/A
3.7.3	Market benefits	Calculation of changes in Australia’s greenhouse gases	N/A
3.8.2	Sensitivities	Sensitivity analysis on all credible options	N/A*

²¹ Although the provisions in section 3.5A.2 of the RIT-T Application Guidelines are not included in the table of binding requirements at Appendix C of the Guidelines, Powerlink has added them to the compliance checklist as the provisions are expressed as being binding in section 3.5A.2 of the Guidelines.

Section of Guidelines	Topic	Requirements	Section of PSCR
3.9.4	Contingency allowance	Details of any contingency allowance included in a cost estimate for a credible option	N/A
3.11.2	Concessional finance	Provide sufficient detail about a concessional finance agreement	N/A
4.1	Community engagement	Description of assessment of requirement for community engagement and, as applicable, how engagement has been undertaken and any relevant concerns sought to be addressed, and how the proponent plans to engage with stakeholder groups.	1.3, Appendix 2

Notes:

N/A denotes not applicable.

* Powerlink will include sensitivity analysis in the PADR.



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