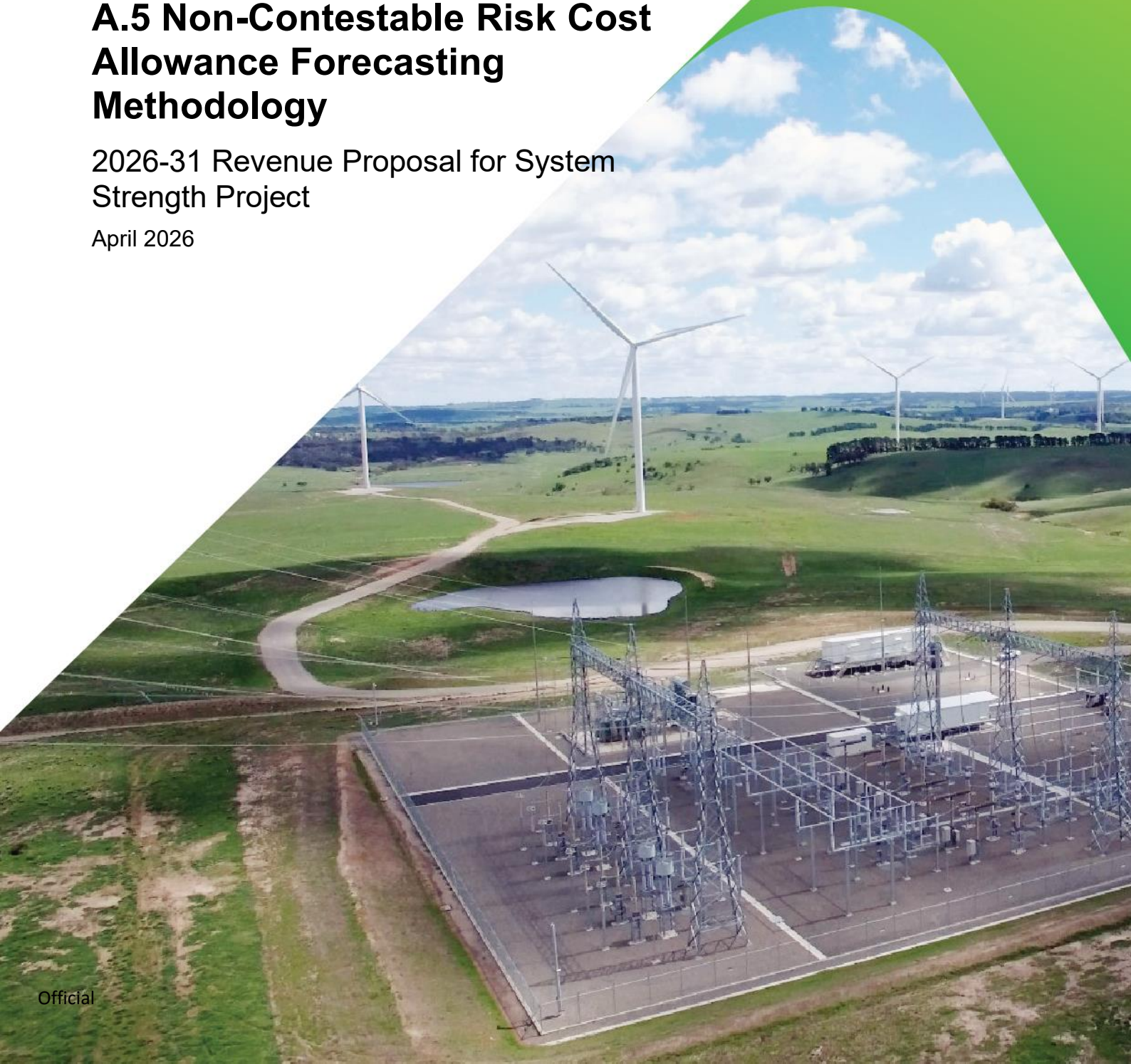
A.5 Non-Contestable Risk Cost Allowance Forecasting Methodology

2026-31 Revenue Proposal for System Strength Project

April 2026



Contents

Acknowledgement of Country

In the spirit of reconciliation, the Transgrid Group acknowledges the Traditional Custodians of the lands where we work, the lands we travel through and the places in which we live.

We pay respect to the people and Elders past and present, and celebrate the diversity of Aboriginal and Torres Strait Islander peoples and their ongoing connections to the lands and waters of NSW and the ACT.

Pokolbin, NSW
Artwork: Yura. Gili. Nanga. the indigenous interpretation of Power. People. Possibilities

1. Background, purpose and structure

1.1. Background

On 12 September 2025, the NSW Minister for Energy issued a Priority Network Infrastructure Project (PNIP) (PNIP Direction) to Transgrid to deliver the System Strength Project ('the Project') under the Electricity Infrastructure Investment Act 2020 (NSW) (EII Act). The Minister appointed the Secretary of DCCEEW as the Infrastructure Planner (IP).

The Project involves installation and commissioning of ten synchronous condensers (syncons) at five sites across the Transgrid network to maintain system strength following the retirement of legacy NSW coal-fired generators. The PNIP Direction specifies that Transgrid is to connect and commission each of the syncons by February 2029. This is a hybrid project as it comprises contestable and non-contestable elements, as set out below.

Treatment	Element
Contestable	• Syncons Package (Original Equipment Manufacturer (OEM)) supply agreement • Long Term Service Agreement (LTSA) contract • Associated Works Package (Design and Construct (D&C)) contracts
Non-Contestable	• Transgrid procurement and contract management of the contestable works • Delivery management of the work • Land acquisition • Long lead equipment procurement • Major road upgrades

The Project is the first hybrid PNIP to be delivered under the NSW EII framework. The AER finalised an update to its revenue determination guideline for NSW non-contestable projects in December 2025 to cater for hybrid projects.

We note that the Project presents a unique set of delivery challenges largely driven by the delivery program required to maintain system strength in NSW, and the novel interfaces and complexities associated with ensuring the successful integration of the OEM supplier and D&C contractor works into the existing NSW transmission network at five geographically dispersed locations.

The Project will be delivered in accordance with Transgrid's Project Management Framework (PMF) which is aligned with the Project Management Institute's Body of Knowledge project management standard. We have taken a thoughtful approach to delivering the Project, focusing on effectively managing these challenges and optimising project outcomes. We have drawn on lessons learned from recent and ongoing projects and have adapted our delivery strategy to ensure we meet the tight delivery timeframes.

1.2. Purpose

Under EII Chapter 6A, Transgrid's annual revenue requirement is to be determined using a building blocks approach. Under clause 6A.5.4, Transgrid's revenue can include compensation for risks that the AER considers are necessary to compensate a Network Operator (i.e., Transgrid) for risks that are not otherwise compensated for in the return on capital. For this project, there are two principal ways to compensate Transgrid for these risks:

- **Non-contestable cost adjustment mechanisms**: which addresses that relate to unpredictable events that are outside of Transgrid's control and cannot be reasonably mitigated or prevented. For these specific risks, we have proposed adjustment mechanisms (as outlined in Chapter 15 of the Revenue Proposal) in accordance with clause 51 of the EII Regulation and clause S6A.1.2(14) of EII Chapter 6A.

- **Non-contestable risk cost allowance**: which compensates Transgrid for residual risks that can be reasonably mitigated or prevented.

The purpose of this document is to set out the non-contestable risk cost allowance. It is supported by a Quantitative Cost and Schedule Risk Analysis (QCSRA) Risk Register, which is provided alongside this document. The Revenue Proposal (the Proposal) is structured as illustrated in Figure 1 to be as clear and accessible as possible to the AER, customers and other stakeholders.

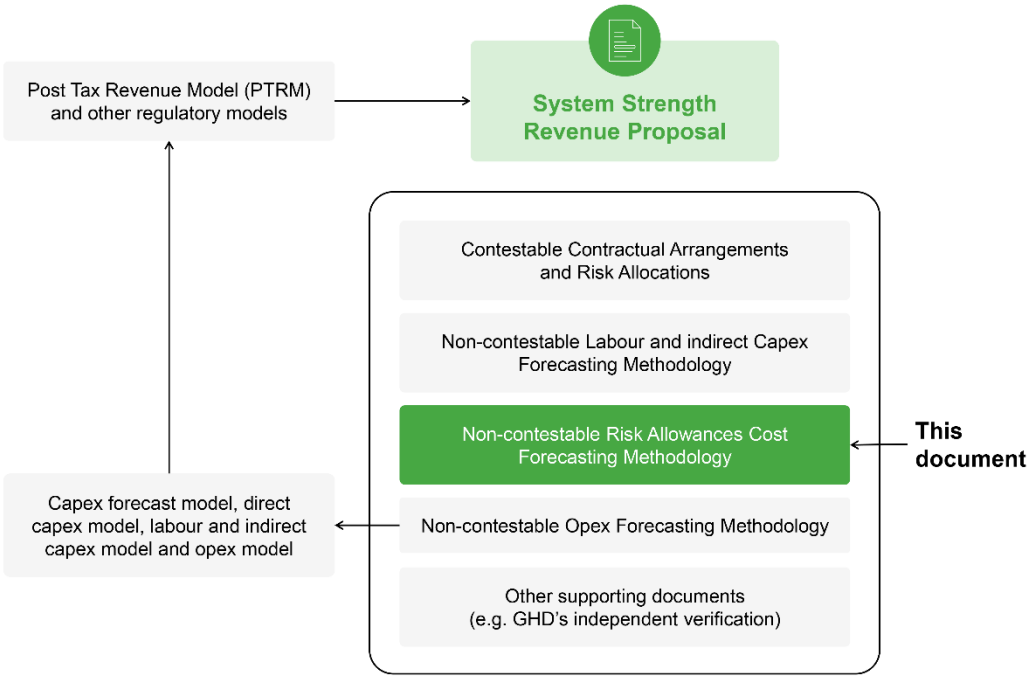


Figure 1 The Proposal structure for System Strength Accelerated Syncon Project

1.3. Structure of this document

The remainder of the document is structured as follows:

- Chapter 2 explains that our approach to estimating the risk cost allowance is consistent with the AER's guidance
- Chapter 3 summarises our proposed risk cost allowance
- Chapter 4 described our approach to identifying and assessing the non-contestable risks
- Chapter 5 describes the Project risks, and the quantification of the risk cost allowance
- Chapter 6 explains how we have verified and validated the risk cost allowance
- Appendix A details our comprehensive QCSRA output
- Appendix B details our risk assessment matrix
- Appendix C details the prolongation costs for the Project used in the QCSRA.

2. Regulatory requirements

This Chapter explains that our approach to estimating the risk cost allowance is consistent with the AER's guidance, which has been applied in recent determinations under the EII framework and the National Electricity Rules (NER).

While the Project is being delivered under the EII framework, the AER's application of EII Chapter 6A is intended to be consistent with the NER, except where there are compelling reasons to deviate from that approach.[1] For that reason, our approach to estimating the risk cost allowance is consistent with the AER's guidance note on the regulation of actionable Integrated System Plan (ISP) projects and, in particular, its guidance on the AER's expectations on the treatment of risks.[2]

The AER's Guidance Note explains that the AER will only accept the inclusion of a risk cost allowance in the capex forecast for a project where:

- residual risks have been identified
- the associated cost estimates of the residual risk are efficient i.e. the consequential cost is adjusted to reflect the likelihood of occurrence.

The AER has indicated that it considers a P50 confidence level is most appropriate for forecasting a risk cost allowance, as it is the point at which risks are shared equally between Transgrid and consumers.

We also note that the AER will not provide a risk cost allowance for:

- risks that are reasonably under, or should reasonably be under, the TNSP's control (for example, deficiencies in the TNSP's policies and procedures)
- risks that would normally be managed by the TNSP as part of its business as usual practices within its overall portfolio of projects (for example, delays in appointing contractors)
- risks that are, or should be, reasonably covered by contract terms (for example, contractor delay)
- risks that are, or should be, covered by insurance (for example, fire or theft), or costs that are reasonably recoverable from third parties.

To inform its assessment, the AER requires a comprehensive and transparent explanation of how the risks have been identified and costed, including:

- risk identification – clearly identifying the risk events
- risk cost assessment – estimating the potential cost impacts, the likelihood of occurrence, the consequential costs and any mitigation/management strategies.

In accordance with the AER's guidance, we have comprehensively and transparently identified and assessed the key risks for the non-contestable portion of the Project, including our ability to efficiently manage, prevent or mitigate these risks (including through insurance) and the magnitude and likelihood of the risk. We consider that there are a range of risks that are best managed by Transgrid as part of our usual risk practices / controls when delivering a transmission project of this size and scope, as opposed to

[1] Please see AER – Revenue determination guideline for NSW non-contestable projects – December 2025, pp2-3
[2] Please see Final Guidance Note – Regulation of actionable ISP projects, pp16-17.

transferring these risks to our contractors and imposing an overly conservative cost built into the contractor's base price.

Our approach is to propose a risk cost allowance for inclusion in our capex forecasts for the non-contestable elements that provides a P50 estimate of the risk costs. To achieve this outcome, this document:

- describes the nature and scope of the risks that will remain with Transgrid in the delivery phase of the Project; it is either not possible or efficient for Transgrid to transfer these costs to the Original Equipment Manufacturer (OEM) supplier or Design and Construct (D&C) contractors
- explains the overall process that we undertook to identify and determine the prudent and efficient cost for these risks
- details the methodology that we have used to quantify the cost for each of these owners' risks including the inputs and assumptions that we have relied on, why the risk cannot be efficiently mitigated, transferred, or avoided, the proposed mitigants informing the residual risk cost and why these are reasonable
- explains how we validated and verified the risk cost allowance.

3. Summary of risk cost allowance

The purpose of this Chapter is to summarise our risk cost allowance, which is $18.41 million. It reflects a risk cost allowance for the pre-period to 30 September 2026 ($4.45 million) and the Regulatory Period ($13.96 million). The risk cost allowance does not factor in the Middle East Conflict impacts.

Table 1 provides a description of the 8 risks that comprise the risk cost allowance, the risk category and the risk cost.

Table 1 Risk cost allowance for the Project ($M, September 2026)

#	Risk name	Description	Risk category	Risk cost ($M)
1.	Commissioning and Integration Challenges	The integration and commissioning of the accelerated syncons into the Transgrid network may result in additional uprating or upgrading of equipment being required to deal with issues such as increased fault levels or changes being required to control systems.	Commissioning	6.08
2.	Extended Inclement Weather	Project delays caused by inclement weather such as heavy rainfall or heat (over and above contracted allowance) which prevents the safe and effective completion of works	Construction	2.69
3.	Third Party Interfaces	Third party interfaces with government departments and utilities result in additional management effort and cost to Transgrid to minimise delays to OEM supplier and D&C contractors.	Construction	1.13
4.	Additional Network Modelling	Additional or more complex modelling required for the Project resulting in additional Transgrid resources or consultant support	Commissioning	2.31
5.	Environment and Community	Additional construction noise and operational noise may result in increased community complaints or the potential to require additional sound mitigation.	Construction	1.82
6.	Equipment Issues	Delays to supply of Transgrid supplied equipment due to unanticipated global supply chain delays and issues with existing equipment within a brownfield environment.	Procurement / Construction	2.47
7.	Changes to Commissioning Approach	Changes to commissioning approach by OEM supplier or D&C contractors result in greater resource requirements for Transgrid to oversee and coordinate, where not covered by proposed adjustment mechanisms.	Commissioning	1.33
8.	Contractor Industrial Action	Additional Transgrid resourcing required as a result of delays arising from contractors or sub-contractors industrial action.	Construction	0.57
Total				**18.41**

4. Risk identification and assessment approach

4.1. Overview

The Project is the first hybrid project to be delivered under the NSW EII framework. It presents a unique set of delivery challenges largely driven by the delivery program required to maintain system strength in NSW, and the novel interfaces and complexities associated with ensuring the successful integration of the OEM supplier and D&C contractor works into the NSW transmission network at five geographically dispersed locations.

To reduce project uncertainty, we have sought to undertake activities that assist in the identification and understanding of risks faced. This has included reducing project uncertainty by:

- undertaking early development activities, including undertaking geotechnical investigations and environmental activities
- engaging multiple contractors in an interactive procurement process, to allow them to assess constructability of the designs, resourcing, site access, planning approval requirements and integration between syncons and enabling works
- multiple lesson learned workshops on other projects to understand the challenges and risks faced.

Following this, we have comprehensively and transparently identified and assessed the key risks for the Project, including our ability to efficiently manage, prevent or mitigate these risks (including through insurance) and the magnitude and likelihood of the risk.

As outlined above, we consider that there are a range of risks that are best managed by a risk cost allowance. This chapter overviews our approach to identifying residual risks and determining the risk cost allowance for the Project.

4.2. Approach to identifying risk cost allowance

Our risk management framework and project risk management procedure are well developed and align with AS ISO 31000:2018 Risk Management Guidelines. The key steps in our risk approach involve:

- understand and establish the context for the potential risk events that could arise
- identify expected risks and establish a risk register
- analyse and evaluate potential risks and identify mitigation and management strategies.

We have ensured there is no overlap between the proposed adjustment mechanisms, cost pass throughs and our proposed risk cost allowances.

4.2.1. Context for project risk

There is an inherent complexity to delivering large brownfield infrastructure projects. In addition, the Project features specific complexities and interdependencies that are compounded by its accelerated nature that affect the risk profile of the Project.

4.2.1.1. Inherent market complexity

Market complexities include adjacent project interfaces, latent conditions, force majeure events, social licence, environmental risks, cost escalation and contractor delivery. The impact of these challenges is

reflected in the performance of several recent major projects in Australia, where substantial claims from D&C contractors have arisen. Examples of recent projects that have faced significant commercial challenges include the M6 Project, Sydney Metro City and South-West, Inland Rail, WestConnex and Sydney Lightrail.

The current infrastructure market is characterised by:

- an unprecedented number of infrastructure projects, particularly in the transmission sector
- an increasingly tight labour market for construction of electricity transmission projects
- global supply chain security and inflationary pressures on construction costs
- social licence issues are increasingly prevalent for transmission projects within Australia and require active consultation and management
- declining contractor appetite to bear risk due to recent difficulties delivering projects.

4.2.1.2. Project-specific complexities

The Project has its unique set of delivery challenges including:

- **Complex and interdependent agreements** – the Project involves complex and interdependent contractual arrangements, including an upstream agreement between Transgrid and DCCEEW, three downstream agreements with two D&C contractors and an OEM supplier and various other contracts with equipment suppliers. These agreements are highly interdependent, meaning any misalignment in scope, schedule, or technical requirements poses significant delivery and compliance risks. This complexity demands precise coordination across all parties, particularly during design, construction, and commissioning.
- **Brownfield vs greenfield challenges** – the works will be completed both within Transgrid operating substations (brownfield works) and adjacent to the substations (greenfield works). Each construction environment presents distinct delivery challenges, e.g. potential differences in resource and capability requirements and delays. Balancing resources, maintaining operational access to the substations, managing different risk profiles, and ensuring efficient coordination between both phases is critical to project success.
- **Intricate technical and commercial interfaces** – the Project involves two distinct delivery streams, enabling works (D&C contractor scope) and syncons install (OEM supplier scope) this requires alignment across technical design, commercial obligations, and delivery schedules. During construction, multiple parties operate under defined access, environmental approvals, and pre-commissioning activities. Effective coordination is essential to manage overlapping scopes and avoid delays.
- **Network integration challenges** – as the NSW Transmission Network Service Provider, Transgrid must ensure the safe, reliable, and secure operation of the backbone transmission network. Successfully integrating the syncons into the broader network requires proactive planning, advanced system studies, complex stakeholder management and coordinated execution across technical and operational teams. The integration of the syncons introduces:
    - **asset management risks**: incorporating new and modified assets into Transgrid's systems makes it increasingly complex to meet compliance and operational standards
    - **network planning complexity**: multiple iterations of network planning studies are required to mitigate the effect of the five syncons on existing transmission infrastructure alongside the impact of the closure of the legacy coal fired power stations

- **network operational challenges**: integration of syncons into the network requires adjustments to system operations, protection schemes, and real-time management
- **compliance with the PNIP Direction**: the scope and timing of the Project are set and well defined; proactive risk management and integrated delivery are critical to meeting the milestones.

Each of these factors contribute to the overall risk profile of the Project, and Transgrid's ability to efficiently manage, mitigate or prevent these risks from occurring.

4.2.2. Identifying expected project risks

Following our assessment of the risk context, we proceeded to identify potential risks that were likely to present themselves within the specific project context in order to develop the Project risk register.

This process included thoroughly examining both the upstream contract with DCCEEW and the downstream contracts with the OEM and D&C contractors to identify risks that are expected to impact the Project's delivery cost or schedule. We have also engaged with various contractors as part of our procurement processes, the selected OEM and D&C contractors as part of contract negotiation and consultation with internal and independent subject matter experts (SMEs) and risk specialists from different disciplines related to the Project including environment, land, stakeholder, commercial, planning and construction, transactions and procurement. Additionally, we have engaged extensively with the Transgrid Advisory Council (TAC) to better understand consumer perspectives in relation to risk and the associated costs.

Risks identified fall into one or more of the following categories:

- **inherent uncertainty** (i.e. inherent quantity and productivity risks) with time or cost impacts – these risks are associated with the uncertainty of the cost item estimated or the duration of an activity in the schedule, i.e. the risk does not arise due to a specific 'event'
- **inclement weather impacts**, including from rain, heat, fire and wind delays – informed by the use of an inclement weather analysis tool
- **contingent risk events** (i.e. discrete risks) with time or cost impacts – relating to specific events that may or may not occur
- **prolongation** – related to Transgrid's indirect costs incurred if the Project extends beyond the planned timeframe.

4.2.3. Analysing and evaluating project risks

Once we established a comprehensive list of risks, we reviewed and qualified them through a series of risk workshops which were attended by internal and independent SME and risk specialists from different disciplines related to the Project.

For each risk, we undertook a qualitative assessment to determine the following:

- potential causes
- consequences and scenarios
- mitigation measures and controls,
- treatments, and
- residual risk rating.

We assigned each risk a 'risk owner' who is responsible for developing and maintaining the risk treatment plan for each individual risk.

We have maintained the risk register established through this process in our central database and have regularly updated it as new risks were identified, and existing risks were treated or closed. We also continually monitor and review changes to our risk positions arising from updated information or changes in circumstances and will continue to do so on an ongoing basis until the Project is complete.

4.3. Approach to estimating risk cost allowance

In alignment with industry standards and Transgrid's internal processes and procedures which are consistent with the Project Management Institute's Project Management Body of Knowledge (PMBOK).

PMBOK is an internationally recognised framework published by the Project Management Institute that outlines standardised processes, tools, and best practices for effective project management. It provides a structured methodology to support consistent planning, execution, and control of complex infrastructure projects, ensuring transparency, risk management, and quality outcomes throughout the Project lifecycle.

Transgrid has undertaken an integrated probabilistic QCSRA to estimate both time and cost risk consequences. The specific QCSRA methodology adopted was a hybrid combination of the 'top-down' Risk Factor, coupled with the First Principles Risk Analysis (FPRA) technique[3].

The QCSRA has been undertaken as an iterative process to ensure that all risks and their associated mitigations were kept up to date. In addition, frequent review and updates to the risk register has ensured that integrity has been maintained to ensure that the risk assessment is robust, without any duplication or overlapping with the proposed adjustment mechanisms.

As outlined above, a core component of the iterative QCSRA development process was engaging with the Project team and broader Transgrid SMEs to carry out the initial qualitative risk assessments, cost and time impact quantification, risk allocation and validation of results. Quantified risks have been iteratively revisited with SMEs and updated in light of new information and ongoing consultation, including the following:

- OEM supply agreement between Transgrid and GE Vernova
- General Conditions of Contract (GCOC) between Transgrid [redacted] (not executed at time of submission)
- General Conditions of Contract (GCOC) between Transgrid [redacted] (not executed at time of submission)
- Long Term Service agreement between Transgrid and GE Vernova.
- TAC project cost and risk allocation Deep Dives, held on 20 November 2025 and 24 February 2026 respectively.

[3] Methodology applied based on: Australian Government, Supplementary Guidance Note 3A – Probabilistic contingency estimation, version 2, November 2023 and Risk Engineering Society and Engineers Australia, Contingency Guideline, 2nd edition, February 2019.

4.3.1. Risk probabilities

We established risk percentage probabilities in accordance with Transgrid's Project Risk Management framework. We derived percentage probabilities based on relevant project SME qualitative assessments of the risk consequence being realised after controls have been implemented. The table included in Appendix B outlines the corresponding percentage bands correlating with the qualitative likelihoods used in the assessment.

4.3.2. Overview of QCSRA process

The analysis was undertaken based on the process outlined below:

- **Data collection and verification**, acquiring the latest master schedule and cost estimate after being subject to health check and rectification process as required.
- **Cost and time related risks revision and identification**, identifying risks with a time or cost impact based on the existing risk register.
- **Risk analysis workshops**[4], conducting iterative workshops with the respective Project Team leads to establish the following inputs:
  - **inherent uncertainty** in the base estimate costs and schedule durations, including uncertainty in time lost as a result of inclement weather within the schedule
  - **contingent risk events** with cost and time impacts that may or may not happen
  - **prolongation (delay) costs** incurred if the Project extends beyond the planned timeframe, based on the Risk Adjusted Schedule results[5].
- **Schedule Risk Analysis (SRA) modelling**, removing any wet weather and contingency allowances in the schedule and establishing the schedule risk analysis model in the schedule risk analysis software, Acumen Risk.
- **Cost Risk Analysis (CRA) modelling**, removing any existing project allowances and contingencies from the cost estimate and establishing the cost risk analysis model in the cost risk modelling software, @Risk[6] .
- **Model integration**, calculating prolongation periods based on the SRA model.
- **Allocate risk costs**, allocating risk costs based on proposed risk allocations for the Proposal
- **Draft results**, running the risk model to produce draft risk results.
- **Outputs validation and verification**, including producing and issuing the final risk analysis report following an iterative review process by the Project Team, and in light of new information including feedback from the TAC.

A comprehensive visual summary of the QCSRA methodology can be found in Appendix A.

[4] Methodology applied in workshops based on: Australian Government, Supplementary Guidance Note 3A – Probabilistic contingency estimation, version 2, November 2023 and Risk Engineering Society and Engineers Australia, Contingency Guideline, 2nd edition, February 2019.

[5] Prolongation impacts are modelled once per causal pathway in the SRA and allocated to individual risks without overlap

[6] Industry standard software sold by Lumivero.

4.3.3. QCSRA simulations and results

Once all time-based inputs were established and following the risk analysis workshops, the SRA risk model (a Monte-Carlo type model) was run, and a probabilistic time-based histogram of completion dates was produced for each Separable Portion. This allows us to best assess the actual outcome of a risk on the specific scope it relates to, given the works are being delivered in parallel (e.g. a delay to SP2 is unlikely to have an impact on SP3).

The histogram reflects the number of 'hits' or simulation iterations that returned a given completion date. The number of hits before a certain date on the histogram is sometimes referred to as a 'confidence interval' which indicates the level of confidence (or P-value) that a completion date can be achieved. For example, 500 hits before date X in a 1000 iteration simulation would indicate a 50 per cent confidence (P50) that date X can be achieved. An example histogram is shown in Figure 2 for reference.

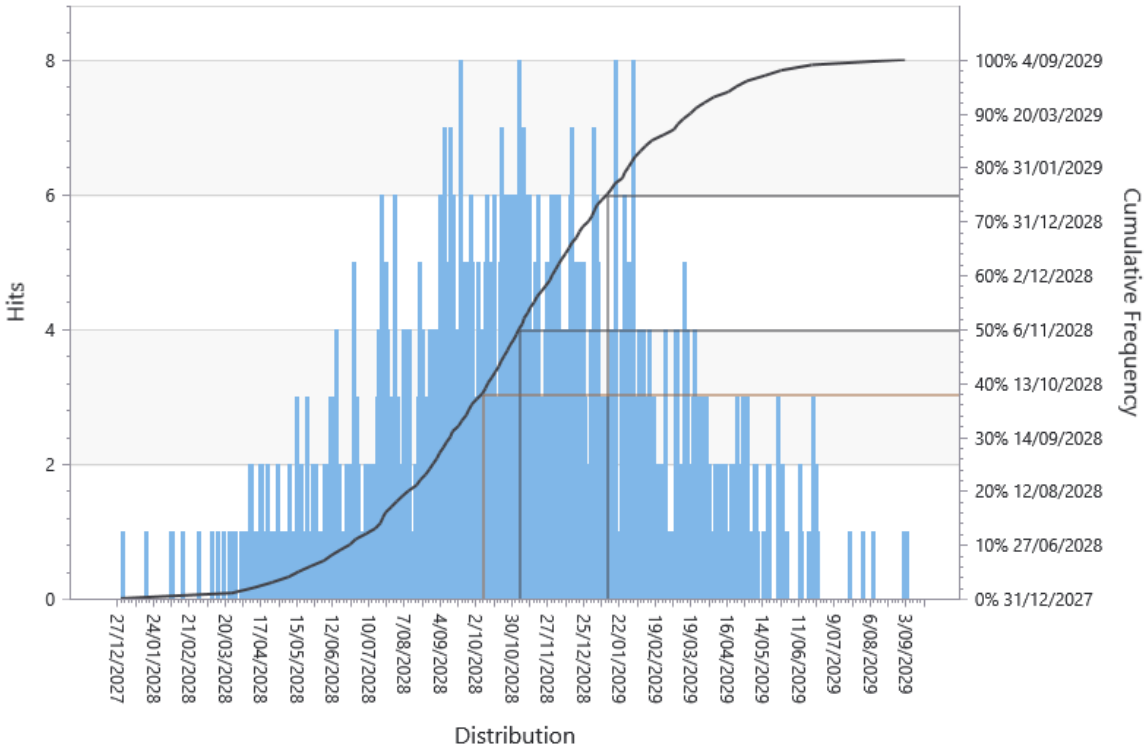


Figure 2 Example SRA histogram reflecting confidence intervals for a given Separable Portion completion.

Following the SRA simulation, P-value dates from P0 to P100 for all Separable Portion completions were imported to the CRA model to be applied as a probabilistic prolongation period. Once all cost-based risk inputs were established, and SRA prolongation periods imported, the CRA probabilistic model was run and a cost-based histogram of risk costs produced for the Project.

While a range of P-values (P0 – P100) are produced as part of the probabilistic analysis, for the purposes of this report, only P50 cost values have been discussed. We can also determine other values with different confidence intervals. The P-Value chosen is determined by the organisation's risk appetite. We note that in the recent HumeLink determination, the AER also indicated that it considers a P50 confidence level is most

appropriate when forecasting a risk cost allowance, as it is the point at which risks are shared equally between Transgrid and consumers.[7]

For the purposes of summarising QCSRA results in this report, risk cost values and the approach to how they have been calculated have been expressed based on the following categories:

- **Contingent cost risks:** risk costs established through the process of analysing probability and consequence of cost risk events that may or may not happen.
- **Inherent cost uncertainty**: risk costs established through the process of analysing cost uncertainty (i.e. variability in estimated quantities and rates).
- **Prolongation:** risk costs established through the process of analysing potential additional costs if the Project is extended beyond the contractual dates for completion (note that this only includes Transgrid's prolongation costs, as any contractor prolongation costs will be addressed through the proposed adjustment mechanism in the contestable portion of the determination).

We developed the proposed risk cost allowance before the Middle East Conflict (as discussed in the Principal Application). As a result, the allowance does not include any additional costs that may arise directly from the conflict.

[7] AER, AER Determination Transgrid's HumeLink Stage 2 Delivery Contingent Project Application, 2 August 2024, p. 38.

5. Quantification of the risk cost allowance

This chapter explains how we have quantified the cost risk of the eight (8) risk cost allowance, including the inputs and assumptions, proposed mitigants and why it is appropriate to include the residual risk cost as an allowance in the base expenditure for the Project. Note the proposed risk cost allowance only relate to non-contestable costs and no not overlap with any pass-through events or adjustment mechanisms.

5.1. Commissioning and integration challenges

This risk relates to uncertainty in commissioning or integration challenges, resulting in additional Transgrid costs, including:

- **Unforeseen network changes impact Control System logic –** changes in design parameters due to evolving network conditions can disrupt control loop performance, affecting system stability, response times, and automation processes. These changes impact Control System Logic and necessitate recalibration and increased validation efforts, leading to operational inefficiencies if not properly managed.
- **Increased fault levels due to syncons integration** – the integration of syncons into the grid can increase fault levels beyond acceptable limits, leading to the need for additional protection system upgrades and network reinforcements. Higher fault levels would likely require additional modifications to the substations and wider transmission network to prevent compliance issues and reduce inefficiencies.
- **Interaction between control of the new syncons and existing Static Var Compensator (SVC) control scheme –** modifications to proprietary reactive plant systems, such as the existing ABB SVC plant, may introduce integration and operational challenges which require upgrade or additional hardware.
- **Increased number of SCADA data points requires additional licences** – additional SCADA interface panels may be required due to increased SCADA data point demands; this may necessitate the purchase of additional licences and additional commissioning effort.
- **Change of OEM transformer supplier –** this may result in additional Transgrid resource requirements such as witnessing factory assessment testing. This is not linked to an adjustment mechanism as there is not expected to be an OEM variation associated with this.
- **Additional requirements from AEMO** – additional Generator Performance Standards (GPS) requirements introduced by AEMO including Inter-Network testing which is not currently envisioned results additional resource requirements to manage (additional internal modelling and coordination with AEMO).

In our base cost estimate we have not allowed for the additional costs considered above due to their overall uncertainty around occurring and uncertainty of cost impact. If these risks eventuated, Transgrid would complete the works to remediate using our internal resources (both office and field staff). These potential additional resourcing requirements are not linked to an adjustment mechanism.

5.1.1.1. A risk cost allowance is required to manage the commissioning and integration challenges

The risk of commissioning and integration challenges is a risk borne by Transgrid which cannot be fully mitigated, transferred or avoided. Transgrid is responsible for any upstream upgrades to the substations and wider transmission network which have not been included in the technical specifications or impact the OEM supplier or D&C contractors' ability to complete their commissioning scope. Further the requirements around GPS are new requirements with the impact still being understood. The exception to this is the

potential for additional SCADA licences which could impact the OEM supplier or D&C contractor's commissioning process; however, the provision of these licences is a Transgrid risk under the contract. Transgrid is also responsible for the final commissioning of the reactive plant control works.

Although this risk cannot be fully efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate any increases in commissioning and integration costs. These strategies, which have informed the estimate of the allowance set out above, include:

- strengthened predictive fault simulation capabilities to assess and mitigate potential disruptions in advance
- leveraged automation tools to streamline real-time adjustments in control loops
- Conducted extensive simulations and validation tests to confirm system resilience against changing network conditions
- conducted detailed system studies to assess the impact of syncons integration
- concept designs for control systems and early assessment of data point requirements.
- lessons learned from Project EnergyConnect (PEC) embedded into the methodology and plan
- for GPS testing requirements, early engagement with AEMO and interface meetings with Powerlink and AusNet.

5.1.2. The risk of commissioning integration challenges not covered by a proposed cost pass through event

This risk cost allowance covers additional Transgrid internal costs arising from commissioning and integration challenges that occur upstream of the OEM supplier and D&C contractors' contractual scope and do not give rise to a contractual variation. Under the Project delivery arrangements, Transgrid retains responsibility for network integration, upstream system upgrades, control system integration and compliance with Generator Performance Standards, and contractors are not entitled to cost variations for issues arising outside their scope where contractual commissioning obligations remain unchanged. As these circumstances do not trigger a contestable or non-contestable adjustment mechanism, no cost pass through is proposed. Reflecting these costs in our base expenditure avoids the need for cost pass-throughs and supports stable and predictable charges.

5.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with this risk is $6.08 million, determined based on the QCSRA inputs detailed in the table below:

Table 2 Commissioning and Integration Challenges QCSRA Summary

Input	Detail
Contingent Cost Risk (54% contribution)	• Unforeseen network changes impact Control System Logic: Probability assessed at 35%, with impacts generally requiring re-work of control system modelling and re-mobilisation of Transgrid commissioning staff to re-do works. Impact costs range from $0.5 million for a small team to address minor issue at a single site through to a larger team to address major issues across all sites ($9.6 million), resulting in a P50 of $1.6 million. • Increased Fault Levels Due to syncons Integration: Probability assessed at 10%, with impacts ranging from no changes to significant rework and uprating of existing equipment. Impact costs range from $0.3 million for additional testing and design verification through to uprating of equipment across all sites ($1.5 million), resulting in a P50 of $0.1 million.

Input	Detail
	• Interaction between control of the new syncons and existing SVC control scheme: Probability assessed at 70%, with impacts generally requiring modification to reactive plant systems. While likely, the magnitude and timing remain uncertain with costs ranging from $0.5 million for minor changes at a single site through to uprating of equipment across all sites ($1.5 million), resulting in a P50 of $1.1 million. • Increased number of SCADA data points requires additional licences: Probability assessed at 5%, with impacts ranging from no changes to extensive SCADA panel procurement, licensing, and integration works. Impact costs range from zero through to significant upgrades across multiple sites ($1.3 million). Resultant P50 is negligible (<$10k). • Change of OEM Transformer supplier: Probability assessed at 40%, with impacts generally requiring additional Transgrid resourcing for Quality assurance. Impact costs range from $0.2 million for internal consultation and design reviews through to international travel for factory verification and ongoing additional resourcing ($1.5 million), resulting in a P50 of $0.3 million.
Prolongation (46% contribution)	• In addition to the costs for additional Transgrid resources and materials to directly manage the risk if realised, a number of the Contingent Cost Risks quantified above also result in prolongation impacts. Given the risks also relate to commissioning works which are generally always on the critical path, there has been a considerable influence on the SRA results. As a result, the prolongation P50 for all risks summarised within Commissioning and Integration Challenges is $2.8 million. • It should be noted that these prolongation costs are not linked to an adjustment mechanism. The resource prolongation for these risks would result from risks arising that aren't related to a variation to the OEM or D&C contractor.

5.2. Extended inclement weather

This risk relates to project delays due to the OEM or D&C contractors exceeding the inclement weather allowance under the contract. Inclement weather events are defined under the contract and include any weather event not amounting to a flood or a cyclone which, as a result of which, it is not safe to proceed with the Project works.

The OEM and D&C contractor's allowance for inclement weather is outlined in Table 3 and Table 4, by Separable Portion. Where this allowance is exceeded, the contractor is entitled to an extension of time (EOT) for a critical path delay only. Although the contractor is not entitled to claim additional costs from exceeding the inclement weather allowance, any time delays to complete the Project will result in Transgrid incurring additional costs, such as the Project Management Team will need to be deployed for a greater period of time. where a severe weather event impacts the progress of the Project and consumes all of the inclement weather allowance.

The OEM and D&C contractor's inclement weather allowance is calculated with reference to the average inclement weather days, as reported by the Bureau of Meteorology, for the relevant locations at which the Separable Portions will be constructed.

Table 3 OEM contractor allowance for inclement weather

Separable Portion	Allowance (days)
SP2a	14 calendar days
SP2b	14 calendar days
SP2c	14 calendar days
SP2d	14 calendar days
SP2e	14 calendar days

Table 4 D&C contractors' allowance for inclement weather

Separable Portion	Allowance (days)
SP3b	15 calendar days
SP3c	15 calendar days
SP4b	15 calendar days
SP4c	15 calendar days
SP5b	15 calendar days
SP5c	15 calendar days
SP6b	15 calendar days
SP6c	15 calendar days
SP7b	15 calendar days
SP7c	15 calendar days

This is considered a prudent and efficient approach to managing the effects of inclement weather for a construction project. The contractor bears risk in respect of its inclement weather allowance, based on what is expected in a typical year. The risk cost allowance is to manage the potential risk of a non-typical year (such as a La Nina or El Nino weather event) that is borne by Transgrid.

Allocation of this residual risk is best placed with Transgrid, rather than the contractor. This ensures that the cost included in the Proposal better reflects likely costs of such events, rather than the contractor including an overly conservative cost allowance within their lump sum cost to cover all possible weather outcomes they may be exposed to during construction.

5.2.1.1. A risk cost allowance is required to manage extended inclement weather

The impact of inclement weather on construction activities is treated as a shared risk under the OEM supply agreement and D&C contracts i.e. the risk is not fully transferred to the OEM supplier or D&C contractors. This reflects that it is appropriate for the OEM supplier and D&C contractors to bear a reasonable level of risk with respect to inclement weather. However, if Transgrid were to seek to allocate all inclement weather events to the contractor, this would result in a significant increase in contract costs.

It is instead more efficient for Transgrid to accept the residual risk of inclement weather above the OEM and D&C contractor's allowance. Consistent with the AER's guidance, inclusion of a risk cost allowance for risks of this nature is generally reasonable.[8]

Although this risk cannot be fully efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate the risk of extended inclement weather. These strategies, which have informed our estimate of the allowance set out above, include:

- OEM and D&C contractors requested to develop wet weather management plans and contingency work fronts in place to minimise impacts where possible
- contract structure only allows contractor to claim additional time for extended wet weather, not cost.
- OEM and D&C contractors are required to mitigate and re-sequence the works where possible and safe to do so
- Transgrid will seek to mobilise staff to other projects in the event of extended delays due to inclement weather to ensure resources are appropriately utilised, and
- Transgrid to ensure OEM and D&C contractors meet their obligations to mitigate delays through strict site supervision and planning.

5.2.1.2. The risk of extended inclement weather is not covered by a proposed cost pass through event

This risk relates only to extended inclement weather which does not meet the definition of a contractor force majeure event or a natural disaster event and therefore the OEM supplier or D&C contractors would not be entitled to a variation (triggering a contestable adjustment). Most commonly this covers events such as higher-than-average rainfall which impacts the contractors' abilities to complete the works. Further this risk only includes costs related to the prolongation of Transgrid resources and does not include any costs associated with the OEM supplier or D&C Contractors.

As part of the Proposal, we have proposed an adjustment event around contractor force majeure events, which include extreme weather events. We have also proposed a cost pass through for natural disaster events (including but not limited to cyclone, fire, flood or earthquake). These events are entirely outside of Transgrid's control and are unable to be mitigated, transferred or avoided. As such, they are best treated as adjustment mechanisms or cost pass-throughs.

5.2.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with this risk is $2.69 million, determined based on the QCSRA inputs detailed in the table below:

Table 5 Extended Inclement Weather QCSRA Summary

Input	Detail
Prolongation	• Inclement weather time lost uncertainty has been applied to SRA activities in the relevant regions based on the geographical location of the works being undertaken. The resultant impact has potential prolongation effects across all Separable Portions, however the most affected sites are the longest construction paths, currently planned through Darlington Point.

[8] AER, *Regulation of actionable ISP projects,* Guidance note, March 2021, p 17.

Input	Detail
	• Prolongation costs calculated for inclement weather are solely based on the costs to extend the Transgrid Program Team and associated Separable Portion-specific Transgrid Delivery Teams (resulting in a P50 contribution of $2.69 million).

5.3. Third party interface risk

This risk relates to third-party interfaces, including:

- delays or rejection in Crown Land acquisition at Armidale
- delays in Essential Energy Approvals and DNSP Accreditation Requirements for Transmission Line (TL) 94J.

The construction of the syncon at Armidale requires the acquisition of a parcel of Crown Land. There is the risk that the process to acquire this land becomes more complex due to:

- Legal restrictions preventing compulsory acquisition of Crown Road land.
- Lengthy negotiation processes with government agencies.
- Environmental or conservation concerns affecting Crown Road land agreements.
- Regulatory approval timelines for Crown Road land leasing or acquisition.

The impact of a more complex acquisition process is the additional Transgrid internal resourcing and consultancy costs to manage the acquisition process. In the event the land cannot be acquired, Transgrid would need to acquire an alternate parcel of land which would likely be at a higher cost, given the need for the acquisition to occur quickly to prevent delays to the D&C contractor (and subsequent delays to the OEM).

For the land acquisition at Armidale, Transgrid has only allowed for the estimated land value (based on third party valuation) and minor legal costs, we have not allowed for any protracted process with Crown Lands or costs associated with acquiring a separate site.

The works at Wellington substation require modifications to TL 94J which is owned by Essential Energy. As the works are on another DNSPs asset there is the risk around the approval process and any accredited service provider (ASP) accreditation requirements. Under our D&C contract, all D&C partners departed from taking this risk and Transgrid is responsible for third party approvals such as Essential Energy and any associated cost impact of additional works or delays.

Transgrid has allowed for a modest amount of project management internal labour to actively manage the interface with Essential Energy and assist in preventing delays. There is however a residual risk of additional effort being required by Transgrid to manage Essential Energy to prevent delays to the D&C contractor.

5.3.1.1. A risk cost allowance is required to manage third-party interface risk

The third-party interface risk is a Transgrid risk under the contract, i.e. the risk is not able to be transferred to the D&C contractors and relates to events that are outside Transgrid's control due to actions of a third party such as Crown Land or Essential Energy. Consistent with the AER's guidance, inclusion of a risk cost allowance for risks of this nature is generally reasonable.[9]

Although this risk cannot be fully efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate interface risk. These strategies, which have informed the estimate of the allowance set out above, include:

- Transgrid resourcing strategy to ensure effective management of various interfaces across multiple disciplines
- agreements in place where feasible
- early engagement with Crown Lands around the acquisition of the land parcel
- interface Management Plan being developed
- early and regular engagement with third parties such Essential Energy
- alternative land acquisition strategy in event of significant delay to negotiations with Crown Lands
- clear land negotiation strategies to streamline discussions
- contingency planning for delayed land access approvals.

5.3.1.2. The risk of third-party interfaces is not covered by a proposed cost pass through event

This risk cost allowance covers additional Transgrid internal labour, consultancy and land-related costs arising from delays or complexities associated with third-party interfaces (including Crown Lands and other network service providers) where no contractual variation arises.

Under the D&C contracts, contractors have not accepted responsibility for third-party approvals or land access, and delays or additional effort required to manage these interfaces do not entitle contractors to cost variations. As a result, these circumstances do not trigger a contestable or non-contestable adjustment mechanism.

Where third-party delays give rise to a contractual variation affecting the contractor's scope or price, those costs would be addressed through the relevant adjustment mechanism. By contrast, where Transgrid incurs additional internal costs to manage third-party interfaces without contractual entitlement, no cost pass-through applies, and inclusion of a probability-weighted allowance in our base expenditure is the most efficient and appropriate treatment.

[9] AER, *Regulation of actionable ISP projects,* Guidance note, March 2021, p 17.

5.3.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with this risk is $1.13 million determined based on the QCSRA inputs detailed in the table below:

Table 6 Third party interface risk QCSRA Summary

Input	Detail
Contingent Cost Risk (98% contribution)	• The risk event resulting in protracted delays or a requirement to acquire an alternative land parcel at Armidale has been assessed at a probability of 10%. Estimated impacts include costs for legal support, support for re-designs and sourcing an alternative site. Resultant P50 value of $0.9 million. • 132kV Transmission line works surrounding Wellington substation may require additional land acquisition to accommodate the final alignment. Probability assessed as 20%, with potential cost implications ranging from $0.5 million to $2 million, resulting in a P50 value of $0.2 million.
Prolongation (2% contribution)	• Delays to Wellington Substation a result of Essential Energy have been assessed to be effectively negligible, where the SRA P50 results reflect under one week of impact to the Wellington site.

5.4. Additional Network Modelling

This risk relates to additional network modelling or inputs being required, resulting in additional Transgrid internal labour and consultancy cost. This risk is limited to a few aspects of uncertainty around the network modelling:

- changes in parameters affect R1 modelling (Network modelling of the Syncons and their impact on the wider NSW and inter-state electrical network)
- contractor's testing and network modelling requires additional input from Transgrid Planning team.

Lessons learned from multiple projects requiring R1 modelling has shown that this risk is difficult to mitigate within the base cost, with so many unknowns at the time of contract award and the potential for rework of the models provided by the OEM by Transgrid staff. Variations in network conditions and input parameters can impact the accuracy and efficiency of R1 modelling. Seasonal fluctuations, shifting demand patterns, and evolving network topology introduce complexities that necessitate recalibration, potentially delaying project timelines and increasing resource demands. Key causes for this include:

- significant variations in the connecting network between summer and winter snapshots
- changes in demand patterns, generation availability, and network topology
- increased complexity in input data, requiring additional adjustments
- new compliance obligations introduced by third parties (AER, AEMO etc.) for system stability
- change in delivery dates of other planned projects.

Modelling resourcing can be difficult to engage as this is a niche skill, particularly given the unprecedented demand in New South Wales (such as from the Renewable Energy Zones) and further abroad. Models supplied that are inaccurate could have a significant impact on the operation of the Network, such as incorrect parameters at R2 commissioning and AEMO not allowing the Syncons to be placed into service. Changes on the transmission network may also necessitate changes to the models at a late stage. To prevent this, Transgrid may need to take on a more active role in the modelling process to ensure the Project timelines can be met and the integrity of the transmission network is maintained. To do this will require additional modelling staff and longer modelling validation steps.

In the base cost estimate, Transgrid has allowed for a reasonable level of modelling support based on the requirements of the OEM supply agreement and likely R1 modelling parameters. Due to the uncertainty, Transgrid has not allowed for higher costs associated with potentially more challenging R1 modelling parameters, nor for a greater level of support to the OEM supplier as we believe these are better addressed through a risk cost allowance.

5.4.1.1. A risk cost allowance is required to manage additional network modelling

The risk of additional network modelling is a risk borne by Transgrid, we are responsible for confirming that the modelling is carried out correctly and for the provision of R1 inputs to the OEM supplier. Further, there are limited Australian based OEMs with experience in commissioning syncons for the same purposes (system strength) in Australia and as such we are dependent on international companies with limited experience in Australian operating and regulatory conditions. Given the complexity of the introduction of the syncons into the transmission network, it is not possible to fully mitigate or avoid this risk.

Although this risk cannot be efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate any additional network modelling costs. These strategies, which have informed the estimate of the allowance set out above, include:

- investigation of modelling personnel and contractors proposed by the OEM
- contract mechanism allows for Transgrid to dictate preferred suppliers. There have been challenges identifying suitable suppliers in this industry
- oversight by experienced supervisors and regular, early coordination with AEMO/Transgrid/OEM
- competency assessments before staff deployment
- on-the-job training programs for testing teams
- development of predefined modelling scenarios for different seasonal conditions to streamline recalibrations
- introduction of automation tools for recalibrating models based on updated network parameters to reduce manual workload.

5.4.1.2. The risk of additional network modelling is not covered by a proposed cost pass through event

These costs relate solely to internal Transgrid labour and consultancies to support the modelling process and do not include any additional cost from the OEM supplier under the contestable component of our submission.

If this risk eventuates it will not result in a variation to the contractor. This risk resolves around the quality of the contractor's R1 modelling submission (no entitlement to a claim), changes in Network conditions causing Transgrid to update their own models and any potential unexpected and onerous conditions that are imposed by AEMO. As such there is no overlap between this risk and the proposed adjustment mechanisms.

5.4.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with the risk is $2.31 million, determined based on the QCSRA inputs detailed in the table below

Table 7 Additional Network Modelling QCSRA Summary

Input	Detail
Contingent Cost Risk (85% contribution)	• Increased effort from Transgrid during network modelling with potential flow on impacts to planning, commissioning and integration with AEMO. Risk assessed to be 50% probability of occurrence. Resultant impact will require anywhere from two to eight technical resources per site over at least three months per site to commissioning support (at a minimum). Resultant P50 contribution of $1.5 million. • Externally driven variations to network conditions and input parameters may require additional R1 modelling to be undertaken by a third-party engaged by Transgrid. Risk of additional modelling being required at some point assessed to be likely (85%), however cost impact is uncertain with estimated updates ranging from between two ($0.2 million) to eight ($0.8 million) across the entire project. Resultant P50 contribution of $0.4 million.
Prolongation (15% contribution)	• In the event further R1 modelling is required, SRA results indicate works at Wellington, Kemps Creek and Darlington may incur minor delays (under 1 week per site). Resultant P50 contribution of $0.3 million).

5.5. Additional Environmental and Community Engagement Works

This risk relates to the potential for additional environmental and community engagement works.

- Community Impact and Disturbance during Major Construction Works.
- Combined Site Noise during construction noise levels requiring modifications

There is a risk that communities will be negatively impacted by disturbances from major construction works, resulting in complaints, reputational damage, and project delays. Potential causes for the disturbance include:

- noise, dust, and vibration from construction activities
- traffic disruptions due to road closures or detours
- prolonged construction periods affecting daily life
- inadequate community engagement and communication
- community resentment and disruption due to large equipment deliveries and construction activities.

The sites for the syncons have significantly different demographics and population distributions which will likely result in different responses by the community. Some sites such as the Newcastle are in older suburban areas which have not had significant construction works completed for a long period of time. Sites such as Kemps Creek are in newer suburban areas which have recently undergone (and continue to undergo) development and construction works. Other sites such as Darlington Point, are in rural areas with low population densities. Wellington is in the Central West region where there is major construction works ongoing as part of the installation of renewable generation. As a result, the impact on communities is likely to differ significantly between sites and there is a high potential for additional community and stakeholder engagement works to be required.

There is also the risk that noise emissions from major plant required at augmented substations will increase total site noise levels, necessitating noise reduction measures post construction. This could lead to additional noise mitigation measures to be constructed later. Potential causes include:

- increased operational noise from newly installed major plant
- cumulative noise impact from multiple sources within the substation
- regulatory noise limits being exceeded, requiring mitigation
- community complaints or environmental compliance obligations
- Transgrid staff accommodation requirements potentially to be further from site than typical, based on early feedback from some councils that have been consulted.

The Project's base expenditure includes costs for a reasonable level of Transgrid resourcing to support community and stakeholder engagement at the five sites during the construction period and typical accommodation requirements. We have also included noise mitigation requirements in our technical specifications based on environmental assessments and lessons learned from PEC. The residual risk not captured in the base forecast relates to:

- additional resourcing required, to address community and stakeholder complaints and disruption
- additional noise mitigation measures such as acoustic barriers or enclosures which will be constructed post practical completion.

Even where noise requirements meet the relevant standards and requirements, there remains a risk that local receivers (residents) could cause disruption to the works causing additional internal Transgrid labour effort to manage.

This risk does not capture any costs associated with additional costs required by the OEM supplier or D&C contractors for additional noise mitigation measures during construction or additional community and stakeholder engagement works.

5.5.1.1. A risk cost allowance is required to manage additional environmental and community engagement works

Community responses to construction projects cannot be fully predicted, particularly in locations where construction projects have not occurred in a considerable time. As the response of third parties cannot be fully predicted it is not possible to fully mitigate or avoid this risk efficiently.

Transgrid has completed significant design work and noise impact studies (as part of the environmental approval process). However, given the novel nature of syncons in the network (particularly in built up areas) and that the syncons are being constructed in a complex brownfield environment with existing substation noise it is not possible to efficiently mitigate the risk of additional noise mitigations being required, without potentially overbuilding noise mitigation measures during the construction phase, which is not in the interest of consumers.

This is a risk that cannot be transferred to the contractor. Transgrid is the proponent of the Project and owns and operates the substations now and into the future. The required design related to noise specified by Transgrid is a requirement of the contracts and is a contractor risk. This risk cost relates to additional stakeholder management required by Transgrid where these requirements are met but the community may still have issues with the noise levels or other impacts from the Project. Maintaining a relationship with

existing landholders is critical to the successful future operation of the sites. Consistent with the AER's guidance, inclusion of a risk cost allowance for risks of this nature is generally reasonable.[10]

Although this risk cannot be efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate risk around uncertainty in environmental and community engagement requirements. These strategies, which have informed our estimate of the risk cost set out above, include:

- contractors are required to meet AS 2436 (2010) (Guide to Noise Control on Construction, Maintenance and Demolition Sites.) contractors are required to meet AS 2436 (2010) (Guide to Noise Control on Construction, Maintenance and Demolition Sites.) As part of the contractual requirements.
- robust stakeholder management plans and early engagement with affected receivers.
- early design work to confirm the need for noise mitigation measures.
- review of noise mitigation measures and outcomes from PEC to inform design specifications.
- engagement of an experience OEM supplier who has significant experience in noise requirements and mitigation measures.
- robust community and stakeholder engagement approach upfront to set the Project up for success and assist in mitigating impact.
- allocating main responsibility for community and stakeholder engagement to OEM supplier and D&C contractors during the main construction works, limiting the Transgrid resourcing included in the base costs.

5.5.1.2. The risk from additional environmental and community engagement works is not covered by a proposed cost pass through event

This risk cost allowance covers additional Transgrid internal costs and post-construction works arising from environmental and community impacts that occur without giving rise to a contractual variation.

The Project's base expenditure includes costs for environmental approvals, standard noise mitigation measures, stakeholder engagement activities and contractor compliance with specified environmental and community requirements. Under the OEM Supply Agreement and D&C contracts, contractors are responsible for meeting these requirements and are not entitled to variations where works are delivered in accordance with the approved designs, specifications and approvals.

However, notwithstanding compliance with contractual and regulatory requirements, residual risks remain that may require Transgrid to undertake additional environmental or community-related works. These include increased Transgrid resourcing to manage heightened community complaints or stakeholder engagement, and the delivery of additional noise mitigation measures post practical completion, where contractors have demobilised and no contractual entitlement exists for further works to be carried out by the OEM supplier or D&C contractors.

The risk cost allowance therefore includes only Transgrid costs that:

- arise from residual environmental or community impacts beyond those allowed for in the base estimate
- do not result from a failure by the OEM supplier or D&C contractors to comply with contractual or approval requirements
- do not trigger a contractual variation or adjustment mechanism.

[10] AER, *Regulation of actionable ISP projects,* Guidance note, March 2021, p 17.

The allowance excludes costs:

- incurred by the OEM supplier or D&C contractors during construction
- associated with variations to contractual scope, price or obligations
- recoverable through any contestable or non-contestable adjustment mechanism or cost pass-through event.

Where additional environmental or community works arise as a result of a contractual change or failure to comply with approval conditions, those costs would be addressed through the relevant contractual or regulatory mechanism.

By contrast, where residual impacts require Transgrid to incur additional costs outside the contractor's scope or following demobilisation, inclusion of a probability-weighted risk cost allowance in our base expenditure is the most prudent, efficient and appropriate treatment compared to cost pass through.

5.5.1.3. Approach to calculating the expected risk costs

The forecast capex contingency allowance associated with this risk is $1.82 million, determined based on the QCSRA inputs detailed in the table below

Table 8 Additional Environmental and Community Engagement Works Risk QCSRA Summary

Input	Detail
Contingent Cost Risk (78% contribution)	• Additional resourcing to address community and stakeholder complaints assessed based on increased Transgrid resourcing and community engagement. Risk probability estimated at 35%, based on a likely 1 in 3 chances of this risk occurring with multiple OSOM movements across the state and 8 local councils affected by these movements and local community impacts from construction at each of the 5 sites. Impacts varying from part time Stakeholder Management Consultant over 12-month period ($0.1 million) through to full time support over the same period ($550k), including miscellaneous costs for community engagement initiatives and general disbursements. Resultant P50 of $0.1 million. • Requirements to address construction and operational noise complaints through measures such as noise attenuation walls or additional insulation assessed at 35% probability with impacts ranging from $2.2 million to $7 million to investigate, design and install the necessary measures across all sites. Resultant P50 of $1.3 million. Designs are approved as compliant related to noise, however there are some close receivers to the sites and in these circumstances based on previous experience, some additional measures or studies may be required.
Prolongation (22% contribution)	• In the event additional noise attenuation works are required following Practical Completion, an extension to members of the Transgrid project team will be necessary to plan and deliver the works. SRA results indicate a cumulative P50 impact of approximately three weeks to complete the works, resulting in a P50 prolongation cost of $0.4 million.

5.6. Equipment Issues

The risk relates to issues related to Transgrid existing brownfield equipment and the delay of Transgrid's supplied high voltage (HV) and secondary system (SS) equipment, due to overseas manufacturing and shipping timeframes.

The construction works are located at existing operational sites, each with ageing infrastructure. Access to the construction areas at these sites is mostly through the existing substations and there are risks concerning the existing equipment and issues arising from their condition that could impede access to the site (e.g. exclusion zones or urgent replacement works).

Transgrid has not allowed any additional expenditure related to this risk in the base cost of the Proposal. Additional costs to Transgrid could include additional condition monitoring equipment to maintain access and avoid exclusion zones, additional coordination effort from project staff with maintenance teams and potential engagement of equipment specialists where issues arise. This cost potentially arises to avoid a variation to the contractors.

There is also the possibility of a delay in the delivery of Transgrid supplied equipment. These delays are potentially caused by the contract model, with changes to the OEM supplier final design, potentially impacting the D&C contractor final design which could necessitate changes to the primary and secondary systems required to complete the works. Delays may also be more prevalent due to the higher demand for equipment amongst all electrical infrastructure projects (including the Main CWO and Enabling RNIPs) and the supply disruptions due to the current global events.

Transgrid has allowed for ordering and shipping times in the Project schedule, in accordance with standard durations based upon information provided by our procurement team. There is however a residual risk that deliveries could be delayed which could have an impact on the OEM supplier or D&C contractor's critical path.

Additionally, there is the risk of damage to the equipment during transit which may not be covered by insurances in place.

If equipment supplied by Transgrid was delayed or damaged in transit, Transgrid would seek to mitigate the impact to prevent a far greater cost impact on the OEM supplier or D&C contractor via variations. Key strategies Transgrid would seek to implement would be:

- sourcing equipment from alternative suppliers, which would attract a cost premium
- requesting earlier slots in the manufacturers production schedule, which would attract a cost premium
- airfreighting equipment to Australia, rather than shipping.

5.6.1.1. A risk cost allowance is required to manage equipment issues

Risks associated with existing brownfield equipment cannot reasonably be transferred to contractors. Given the nature of these risks, they are neither commercially transferable nor capable of being fully mitigated. Accordingly, they are most effectively and efficiently managed by Transgrid.

Supplier delays is a risk that is associated with the actions or requirements of a third party. While contractual arrangements will be in place with suppliers, there is no ability to lock in delivery dates or obtain liquidated damages from the supplier large enough to cover the cost impact of delay to the Project, without significant increases in the cost of the contract over and above what would be deemed prudent, reasonable

and efficient. Consistent with the AER's guidance, inclusion of a risk cost allowance for risks of this nature is generally reasonable.[11]

Although this risk cannot be fully mitigated, transferred, or avoided, Transgrid has several strategies to mitigate this risk. These strategies, which have informed our estimate of the cost allowance set out above, include:

- review of access to site and critical equipment condition (e.g. existing power transformers and circuit breakers adjacent to the proposed access routes through the substations)
- locking in manufacturing and shipping slots as early as possible, aligning with the Project timeframe
- early procurement ahead of critical path and providing storage locally
- procuring directly from suppliers with a program-wide order to improve priority with the supplier.

5.6.1.2. The risk of equipment issues is not covered by a proposed cost pass through event

Where equipment issues arise—whether due to brownfield conditions, delays to supplied equipment, or damage in transit—Transgrid may incur additional internal or third-party costs to actively mitigate impacts and protect the contractors' critical path.

These costs are incurred to avoid materially larger downstream impacts, including contractor delays and variations, that would ultimately increase total project costs. Accordingly, this risk is most efficiently managed through a probability-weighted risk cost allowance included in our base expenditure. Providing an upfront allowance appropriately aligns incentives for Transgrid to mitigate impacts early and ensures consumers are not exposed to higher and more volatile costs that would arise if these risks were addressed through contractual variations or pass-through mechanisms.

5.6.1.3. Approach to calculating the expected risk costs

The forecast capex contingency allowance associated with this risk is $2.47 million, determined based on the QCSRA inputs detailed in the Table below

Table 9 Equipment Issues QCSRA Summary

Input	Detail
Contingent Cost Risk (35% contribution)	• Additional direct costs incurred as a result of mitigation efforts to accelerate design works, or in the unlikely event that repairs to equipment damaged during transit are required ($0.7 million). • Complexities of working in a brownfield site around existing ageing equipment installations may require unforeseen modifications to project delivery that have not yet been addressed as part of detailed design. Risk probability estimated at 20%, with impacts ranging from routine maintenance on existing equipment (no project cost impact) to protracted Project Team standdown and complex online condition monitoring (OLCM) installations. Resultant P50 value of $0.1 million.
Inherent Cost Uncertainty (18% contribution)	• Transgrid has proactively placed orders for a majority of free-issued equipment based on criticality to project delivery timelines. Some minor residual scope growth uncertainty remains for outstanding equipment which has been estimated at a P50 value of $0.4 million.

[11] AER, *Regulation of actionable ISP projects,* Guidance note, March 2021, p 17.

Input	Detail
Prolongation (46% contribution)	• Variability in the estimated manufacturing and delivery timeframes of Transgrid supplied equipment was assessed on a case-by-case basis. • Prolongation impacts arising from working in a brownfield site around existing ageing equipment installations has a consequential P50 delay impact to a value of $0.6 million. • Supplier delays could potentially impact all separable portions. As a result, prolongation risk costs have been calculated based on the prolongation rates identified in Appendix C. The consequential prolongation costs carry a sizeable impact (resulting in a P50 contribution of $0.5 million).

5.7. Changes to Commissioning Approach

This risk relates to uncertainty around the commissioning approach that will be adopted by the OEM supplier and D&C contractors. As part of our responsibilities under the agreements and our general obligations under the NER, we are required to witness all greenfield commissioning activities and to provide active support during brownfield commissioning activities. The level of support required, and the cost of that support is heavily influenced by the end commissioning approach that the OEM supplier and D&C contractors will take, this includes:

- Duration of commissioning activities, the OEM supplier and D&C contractor are obligated to meet practical completion dates under their respective agreements, however it is up to them to determine how best to achieve these dates, including the durations of the complex commissioning tasks (particularly for greenfield activities which are not outage driven). Noting that the commissioning approach broadly was detailed during the RFT process, the detailed approach and methodologies have not been established.
- Intensity of the commissioning activities, the OEM supplier and D&C contractors can determine the best rostering approach to meeting the commissioning timelines, including the specific outage constraints. This means that they may implement a 24-hour roster to ensure they meet outage constraints or have a higher number of resources on site. The contractors may choose to implement this at their own cost (i.e. no variation) and Transgrid will need to provide the required support services.

In the base cost estimate, Transgrid has allowed for a commissioning program based on the tender programs provided by the OEM supplier and D&C contractors. Due to the uncertainty whether these tender programs will be implemented, Transgrid has not allowed for additional resources to support an alternate commissioning approach or higher costs for the existing resources (e.g. if additional overtime is required this will be an additional cost). We have only allowed for a lean commissioning costs as we believe these are better addressed through a risk cost allowance as opposed to building these costs into the base cost.

5.7.1.1. A risk cost allowance is required to manage changes to commissioning approach

The risk of changes to the commissioning approach is a retained by Transgrid which cannot be fully mitigated, transferred or avoided efficiently. Under our OEM supply agreement and D&C contract, the OEM supplier and D&C contractors have control over the commissioning approaches they will use to commission the assets. It is not efficient for Transgrid to fully stipulate the commissioning approaches and program in the OEM supply agreement and D&C contracts as this will drastically limit their ability to manage and prioritise their works and will result in an increase in costs. Allowing the OEM supplier and D&C contractors the ability to fully manage and plan the works allows them greater flexibility, de-risking their ability to achieve the required practical completion dates. This decrease in risk results in a lower overall contestable cost component.

Although this risk cannot be fully efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate any increases commissioning costs. These strategies, which have informed the estimate of the allowance set out above, include:

- requirement for the tenderers to provide a commissioning approach as part of the tender submissions
- early requirement for the OEM supplier and D&C contractors to provide commissioning management plans and programs, which will enable Transgrid time to set the appropriate resourcing early to minimise costs and inefficiencies (alongside influence the OEM supplier and D&C contractors)
- use of Transgrid internal resources allows us to better adapt to changes in commissioning approaches
- use of local resources where possible to minimise non-productive time for Transgrid staff.

5.7.1.2. The risk of changes to commissioning approach is not covered by a proposed cost pass through event

This risk cost allowance covers additional Transgrid internal costs arising where the OEM supplier or D&C contractors adopt a commissioning approach that differs from that assumed in the base estimate without giving rise to a contractual variation.

Under the OEM Supply Agreement and D&C contracts, contractors retain discretion over the sequencing, duration and intensity of commissioning activities in order to meet practical completion dates. Where contractors elect to accelerate commissioning, increase resource intensity, or undertake works outside standard hours, they are not entitled to a variation to the contract sum, provided contractual obligations continue to be met. As a result, these decisions do not trigger a contestable adjustment mechanism.

However, changes in commissioning approach of this nature can require Transgrid to provide additional support, including increased engineering oversight, field attendance, system operations coordination and out-of-hours resourcing. These impacts fall on Transgrid and are not addressed through any contractual or regulatory cost recovery mechanism.

The risk cost allowance therefore includes only Transgrid internal costs that:

- arise from contractor-driven changes to commissioning methodology or intensity
- do not result in a change to contractual scope, price or obligations
- do not trigger a contestable or non-contestable adjustment event.

The allowance excludes:

- costs incurred by the OEM supplier or D&C contractors;
- commissioning costs arising from contractual variations
- changes to Transgrid resourcing that arise as a direct consequence of a variation being issued to the OEM supplier or D&C contractors.

Where changes to commissioning scope or requirements result in a contractual variation, those costs would be addressed through the relevant adjustment mechanism. By contrast, where contractors independently modify their commissioning approach without contractual entitlement, inclusion of a probability-weighted risk cost allowance in our base expenditure is the most prudent, efficient and appropriate treatment compared to cost pass through.

5.7.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with this risk is $1.33 million, determined based on the QCSRA inputs detailed in the table below.

Table 10 Changes to Commissioning Approach QCSRA Summary

Input	Detail
Contingent Cost Risk (100% contribution)	• Increased Transgrid resourcing in response to more aggressive OEM commissioning program than tendered. Probability of commissioning plan varying from tendered program estimated at 50% (based on aggressive contractor programs). Cost impacts estimated to range from two additional Transgrid technical resources working double-shift weekends over a 12-week period ($0.2 million) through to full time ongoing support in addition to weekend work ($5.0 million). Resultant P50 contribution of $1.33 million.

5.8. Contractor Industrial Action

This risk relates to uncertainty around the impacts of delays arising from contractor or sub-contractor industrial action. Recent projects have shown that there is a high risk of protected industrial action on construction projects. Employee Agreements (EA) are typically for a 3-year period meaning that these EAs will be renegotiated during the Project.

This risk is limited to contractor and sub-contractor industrial action only and the potential cost impacts to the Project from the prolongation of Transgrid resources to manage the Project. This risk does not allow risk costs related to Transgrid staff industrial action. Transgrid industrial action is considered a business-as-usual risk that Transgrid needs to manage.

Contractor industrial action if taken will is highly likely to delay the Project and potentially give rise to prolongation costs for the Project and the need for additional Transgrid labour. The current labour forecast does not include any allowance for prolongation. The OEM Supply Contract and D&C contract does not allow for cost variations in relation to industrial action and therefore there will be no cost impacts to the contract sum because of this and no trigger of the Contestable Adjustment Event (contractor variations).

5.8.1.1. A risk cost allowance is required to manage the risk of contractor industrial action

The risk of contractor or sub-contractor industrial action cannot be fully mitigated, transferred or avoided. Under the OEM Supply agreement and D&C contract the OEM supplier and D&C contractor's take the cost risk of any impacts to industrial action arising from their own staff and/or sub-contractors. However, they are entitled to an extension of time if an impact to the critical path can be substantiated. It would be an unreasonable position (and not industry standard) for suppliers and contractors to take on the principal's risk cost of labour prolongation.

Although this risk cannot be fully efficiently mitigated, transferred, or avoided, Transgrid has several strategies to mitigate contractor industrial action. These strategies, which have informed the estimate of the allowance set out above, include:

- contractor early engagement with their workforce
- senior management Steerco's between all suppliers and contractors to understand industry wide impacts

- Transgrid early engagement with relevant unions
- lessons Learned from the most recent negotiation rolled into the contractor EA strategies.

5.8.1.2. The risk of changes to commissioning approach is not covered by a proposed cost pass through event

This risk cost allowance covers the prolongation of Transgrid internal costs, arising from a Contractor or sub-contractor Industrial Action event as defined under the OEM supply agreement or D&C Contract. It does not include any costs related to the OEM supplier or D&C contractors.

The proposed Non-Contestable Adjustment mechanism relating to Transgrid labour as a result of a Contestable Adjustment Mechanism will not be triggered by this risk because the contractor is not entitled to a variation in costs for this risk. This risk covers additional Transgrid project resources, over and above the forecast resources in our base cost allowance, related to contractor industrial action where they are not entitled to additional cost.

5.8.1.3. Approach to calculating the expected risk costs

The forecast allowance associated with this risk is $0.57 million, determined based on the QCSRA inputs detailed in the table below.

Table 11 Industrial Action QCSRA Summary

Input	Detail
Contingent Cost Risk (100% contribution)	• Prolongation effects resulting from contractor or sub-contractor industrial action have been assessed at 50% likelihood (based on recent Enterprise Bargaining periods for major projects), impacting the Project from anywhere between two weeks to two months depending on the event severity. SRA results indicate a cumulative P50 delay impact of approximately four days per site, resulting in a cumulative P50 value of $0.57 million due to prolongation.

6. Validation and verification of risk cost allowance

Validation and verification of the risk cost allowance have been provided through internal and external review and endorsement processes including:

- peer reviews via establishment of a risk review working group
- external risk advisors such as Tracey Brunstrom & Hammond (TBH) being embedded within the team to support risk identification and quantification
- independent advice on specific aspects from North Projects (formerly Fission)
- independent review of proposed risk cost allowance by GHD
- executive reviews though workshops, including with the TAC
- Board review and endorsement.

6.1. External risk advisors

To provide sufficient rigour and support Transgrid's risk management and quantification processes, external risk specialists such as TBH have been engaged in the risk development process. These advisors have been embedded within the teams to ensure industry best practice is applied and adequate checks and balances are implemented across the key project workstreams.

6.2. Independent advice from North Projects

North Projects is an independent cost estimator that Transgrid has engaged. North Projects was engaged to provide detailed risk register and estimate review.

6.3. Independent review of risk process by GHD

As part of its independent review of the Project's capex forecast, GHD has reviewed the risk cost allowance proposed by Transgrid. Overall, GHD considers that our risk cost allowance estimate is prudent, efficient and reasonable. In addition, GHD considers the methodology applied by Transgrid aligns with the AER's guidance note on the regulation of actionable ISP projects

6.4. Executive review

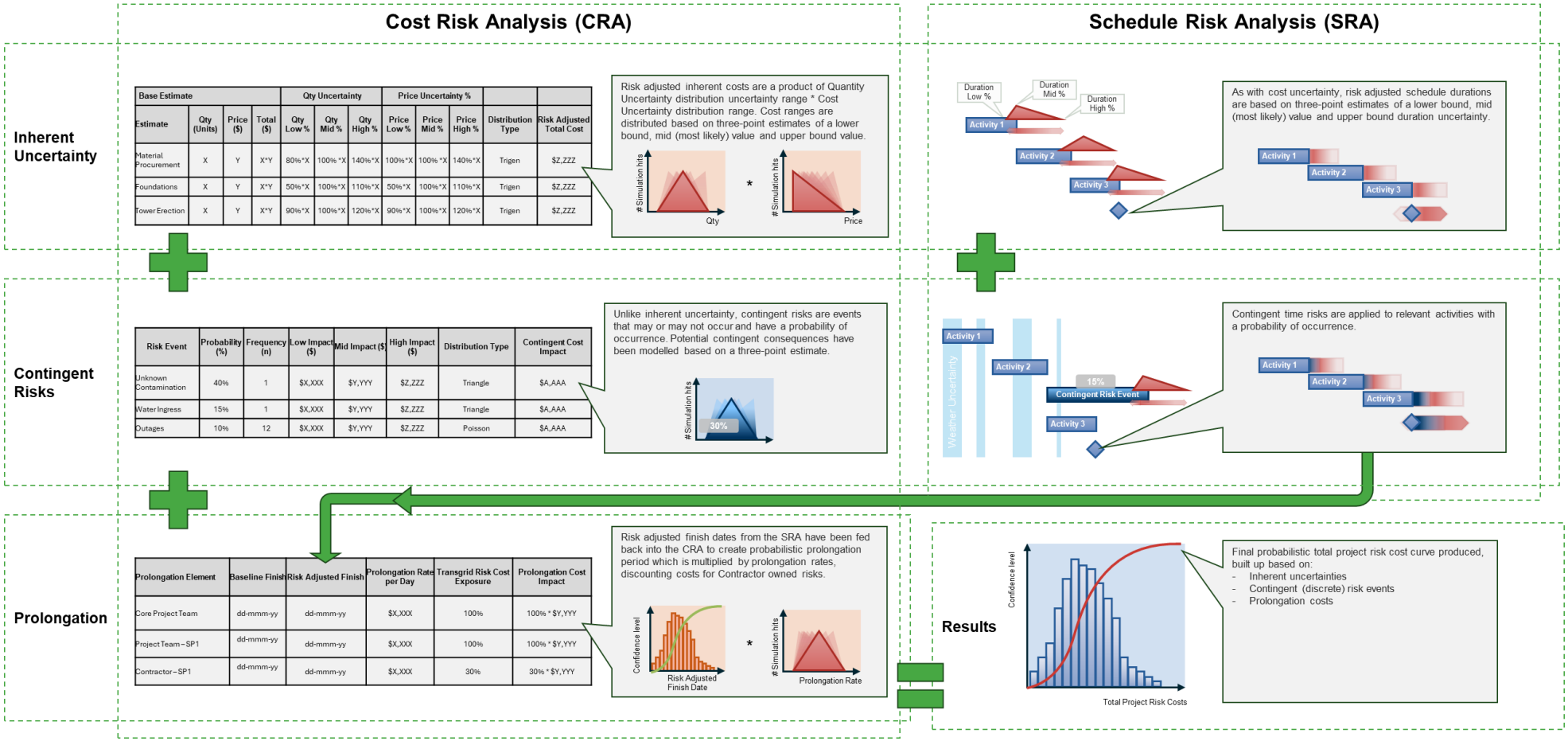
Several presentations to the Executive have been held to provide executive review and oversight. In addition, multiple Board and investor workshops have been conducted which have included a review risk process, basis and quantification.

6.5. TAC Review

The TAC was presented with the Risk Cost Allowance and the associated risks. The TAC queried the Contractor Industrial Action risk, with their question centring around if this risk is to cover contractor costs because of their industrial action. We clarified to the TAC that this is not the case, and the risk cost allowance only covers for potential Transgrid costs because of contract or industrial action. No other objections were raised by the TAC on the Risk Cost Allowance and associated risks.

Appendix A – Comprehensive QCSRA Output

Appendix A provides an overview of the QCSRA process, discussed further in section 4.3.2 above.



Appendix B – Risk Matrix

Appendix B provides the detailed risk matrix, used to inform the risk assessment and quantification process for the Project.

Consequence						Likelihood				
	Cost	Time	Reputation, community & media	Work health & safety	Environment	Rare 0%-5%	Unlikely 5%-30%	Possible 30%-50%	Likely 50%-90%	Almost certain >90%
Catastrophic	Capex budget change >$10m	Major project milestone overrun: >2 months	Serious public outcry, heightened government concern or media coverage with extensive national coverage	Single fatality or any type of irreversible disability. Major injury to >10 people, unable to return to work	Permanent irreversible environmental impact or significant damage across multiple sites	Medium 4	High 3	High 2	Extreme 1	Extreme 1
Major	Capex budget change $4m – $10m	Major project milestone overrun: 1 – 2 months	Significant adverse national media reporting and public attention	Major or reversible injury, requires long term ongoing treatment and rehabilitation. Significant safety breach with immediate impact on operations at worksite	Serious, long term, widespread environmental damage	Medium 5	Medium 4	High 3	High 2	Extreme 1
Moderate	Capex budget change $1.5m – $4m	Major project milestone overrun: 2 weeks – 1 month	Adverse one-off attention from media or heightened concern by a local community and government	Serious injury requiring medical or hospital treatment resulting in need for alternate working or lost time injury	Limited, moderate extent of environmental damage, which can be rectified over the medium-term	Medium 6	Medium 5	Medium 4	High 3	High 2

Consequence						Likelihood				
	Cost	Time	Reputation, community & media	Work health & safety	Environment	Rare 0%-5%	Unlikely 5%-30%	Possible 30%-50%	Likely 50%-90%	Almost certain >90%
Minor	Capex budget change $0.5m – $1.5m	Major project milestone overrun: 5 days – 2 weeks	Minor adverse local public, government or media attention and complaints	Minor injury requiring medical treatment or moderate 'safe working' breach likely to impact operational activities	Minor, localised environmental impact, which can be rectified in the short term	Low 8	Low 7	Medium 6	Medium 5	Medium 4
Minimal	Capex budget overrun <$0.5m	Major project milestone overrun: <5 days	Public concern restricted to local complaints or local media enquiry or minor reports	Minor injury requiring first aid treatment or minor 'safe working' breach unlikely to impact operational activities	Minimal, localised environmental impact, which is able to be immediately rectified	Low 8	Low 8	Low 8	Low 7	Low 7

Appendix C – Prolongation Costs

Appendix C outlines the rates relied upon when calculating prolongation costs. The rates outlined below were multiplied against prolongation periods from the SRA to determine a probabilistic range of costs resulting from prolongation for each Separable Portion.

Relevant Party	Prolongation Element	Average Monthly Prolongation Rate	Min Rate ($ / month)	Mid Rate ($ / month)	Max Rate ($ / month)
Transgrid	PGM Transgrid Program Team Prolongation	$1.63m	$1.22m	$1.63m	$1.93m
	NEW Transgrid Project Team Prolongation	$0.55m	$0.37m	$0.55m	$0.70m
	AR1 Transgrid Project Team Prolongation	$0.55m	$0.36m	$0.55m	$0.70m
	DNT Transgrid Project Team Prolongation	$0.71m	$0.48m	$0.71m	$0.86m
	KCR Transgrid Project Team Prolongation	$0.56m	$0.36m	$0.56m	$0.70m
	WL1 Transgrid Project Team Prolongation	$0.69m	$0.47m	$0.69m	$0.89m

Note: Prolongation costs were only quantified where SRA results indicated that delays may affect the target delivery date of a Separable Portion or whole of Project.