

Nuttall Consulting

Regulation and business strategy

Review of the Transend Revised Revenue Proposal

A report to the Australian Energy Regulator

Public - Final Report

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1. Introduction

1.1. Background

Transend Networks Pty Ltd (Transend) is the electricity Transmission Network Service Provider (TNSP) in Tasmania. Transend is presently subject to a revenue cap in accordance with a decision made by the Australian Competition and Consumer Commission (ACCC) in December 2003. That revenue cap is due to expire on 30 June 2009.

The Australian Energy Regulator (AER), in accordance with its responsibilities under Chapter 6A of the National Electricity Rules (NER), is determining Transend's maximum allowed revenue for its prescribed transmission services during the 2009/10 to 2013/14 period.

Under chapter 6A (Economic Regulation of Transmission Services) of the NER, Transend is required to submit to the AER a revenue proposal in relation to the regulatory control period that commences on 1 July 2009.

In May 2008, Transend submitted a revenue proposal to the AER. The AER engaged a number of consultants to provide advice on various elements of this proposal. Of most relevance to the review discussed here, the AER engaged:

- WorleyParsons to undertake a review of various elements of the revenue proposal, including most cost categories associated with historical and forecast expenditure; and
- Nuttall Consulting to undertake a review of the ex post and ex ante expenditure in the asset renewal capital expenditure category, which was excluded from the WorleyParsons review.

The AER released its draft decision on Transend's maximum allowed revenue for its prescribed transmission services during the 2009/10 to 2013/14 period, in November 2008. This draft decision included a number of reductions to Transend's revenue proposal.

In January 2009, Transend submitted a revised revenue proposal (revised proposal) in response to the AER's draft decision.

1.2. Terms of reference and methodology

The AER has engaged Nuttall Consulting to undertake a review of Transend's revised proposal with regard to a number of matters covering:

- **Renewals** - Transend's proposed reinstatement of revenue associated with its ex ante renewal capital expenditure forecast, for which the AER's draft decisions included a reduction;
- **Waddamana-Lindisfarne 2nd circuit project** - the increase in the ex ante expenditure allowance due to the Waddamana-Lindisfarne 2nd circuit project, which was classified as a contingent project in the AER's draft decision (and Transend's

original revenue proposal), but Transend now considers should be allowed for in its ex ante allowance; and the appropriateness of this revised position, given the changes in the economic circumstances since the AER's draft decision;

- **Operational telecommunications** - the increase in Transend's proposed operating expenditure allowance, due to better information available to Transend after its purchase of a telecommunications service provider subsequent to its original proposal; and
- **Sheffield-Burnie 110 kV line augmentation project** - the appropriateness of Transend's expenditure forecast for the Sheffield-Burnie 110 kV line augmentation project, given the changes in the economic circumstances since the AER's draft decision.

Our approach has entailed a desktop review of Transend's revised proposal and supporting information. In undertaking this review, we have held a set of meetings over two days with Transend staff to discuss the four items above, plus held other meetings via telephone with relevant personnel. We have also requested additional information and clarifications from Transend to aid our understanding and considerations.

In undertaking our review, we have been mindful of the capital and operating expenditure objectives, criteria, and factors provided in Chapter 6A of the NER.

1.3. Structure of report

The report is structured as follows:

- In section 2 we provide an overview of the key findings and recommendations of our review.
- In the four remaining sections, Section 3 to Section 6, we discuss the four items in our review separately, and provide recommendations on the adjustments to Transend's revised proposal.

2. Overview of review findings and recommendations

Nuttall Consulting has considered the information provided by Transend to support its position in its revised proposal on the four elements under review, namely:

- asset renewals;
- Waddamana-Lindisfarne 220 kV 2nd circuit;
- operational telecommunications; and
- Sheffield-Burnie 110 kV line augmentation project.

In most cases, Nuttall Consulting does not consider Transend has reasonably demonstrated that its revised position is appropriate. Only in the case of the Sheffield-Burnie 110 kV line augmentation project does Nuttall Consulting agree with Transend's position.

With regard to Transend's forecast expenditure on the renewals and operational telecommunications items, Transend is proposing increases in expenditure from that allowed for in the AER's draft decision. Based upon Nuttall Consulting's review, we do not consider that Transend has reasonably demonstrated that these increases represent the prudent and efficient amount to achieve the capital and operating expenditure objectives of the NER.

We do however consider that Transend has reasonably demonstrated that an amount above that allowed for in the AER's draft decision is reasonable. Based upon the information provided, we consider that the following increases from the AER's draft decisions are required to prudently and efficiently achieve the capital and operating expenditure objectives of the NER:

- a 13% (\$23 million) increase in forecast capital expenditure on renewals, which represents a 10% reduction to that proposed by Transend; and
- a 7% (\$1.3 million) increase in forecast operating expenditure on telecommunications, which represents a 2% reduction to that proposed by Transend.

With regard to the Waddamana-Lindisfarne 220 kV 2nd circuit project, Nuttall Consulting considers that this project should continue to be treated as a contingent project until Transend can adequately demonstrate:

- the planned outage of Gordon Power Stations will most likely extend across the peak winter period in 2014; or
- the risks associated with the uncertainty in the outage timing are sufficient to justify the project under the regulatory test, considering all reasonable alternatives.

Nuttall Consulting has also assessed the impact of preliminary load forecasts that Transend has prepared for the Waddamana-Lindisfarne 220 kV 2nd circuit project and the Sheffield-Burnie 110 kV line augmentation project. In both cases, Nuttall Consulting agrees with

Transend's position that the preliminary forecasts will not change the expenditure allowance associated with these projects.

However, in appreciating the significance of this finding, in both cases Transend's preliminary forecasts for the specific area did not indicate a significant change to the previous forecast used to develop its revenue proposal i.e. the forecast prepared prior to the present financial circumstances. In the case of the Sheffield-Burnie 110 kV line augmentation project, the revised forecast for the Burnie area actually predicts an increase in demand in that area from the previous forecast.

Transend has stated that these forecasts are preliminary in nature and further work, including consultation with customers, is being undertaken. Should these forecasts be revised prior to the AER's final decision, such that there was a significant reduction in maximum demand in these areas from that predicted in the previous forecasts, then Nuttall Consulting's findings on this matter may need to be reconsidered.

Furthermore, Nuttall Consulting understands that there is an acceptance that the overall state demand is forecast to grow at a reduced level from that previously forecast (e.g. see Appendix 11 of Transend's revised proposal). Given that Transend's preliminary 2009 forecast for the areas assessed did not indicate any significant reduction then it must be assumed that a much greater reduction must be occurring in other areas not under review here. Therefore, Nuttall Consulting cautions against extrapolating the findings on the two projects reviewed across other projects not in the specific areas considered here.

3. Renewals

3.1. Background and appreciation

Nuttall Consulting was engaged by the AER to undertake a review of Transend's ex ante renewal capital expenditure in Transend's original proposal. The average annual asset renewal expenditure in the next period is forecast by Transend to increase by \$8.6 million to \$45.3 million from the equivalent average over this period, \$36.7. This represents a 23% increase in asset renewal expenditure.

Based upon our initial review, Nuttall Consulting recommended a 22% reduction in renewal expenditure, reducing Transend's proposed expenditure on renewals in the next revenue period from \$227 million to \$177 million. This represented an 8% reduction in overall capital expenditure.

The Nuttall Consulting recommendations included:

- A reduction of \$36.5 million on Transend's proposed substation redevelopment projects, involving the Reyrolle OS10 circuit breakers. This represented the most significant reduction, where by a 40% reduction in Transend's proposed expenditure of \$90 million was recommended.
- A \$9.1 million reduction across two secondary system replacement projects.
- A \$4.4 million reduction on a wood pole replacement project.

The AER accepted Nuttall Consulting's recommendations in its draft decision.

Transend's revised proposal seeks the reinstatement of the majority of the recommended reductions. Transend's revised proposal only accepts a reduction of \$3.5 million across its renewal program. In this regard, Transend's revised proposal allows for the full reinstatement of the expenditure on substation redevelopments and wood poles, and a partial reinstatement of expenditure on the secondary systems.

This section discusses Nuttall Consulting's review of Transend's revised proposal and its supporting information. The following sections consider each of the three matters separately, namely:

- substation redevelopments
- secondary systems; and
- Burnie-Waratah wood poles replacement.

3.2. Substation redevelopments

3.2.1. Overview of Nuttall Consulting renewal report and AER decisions

A large proportion of the ex ante capital expenditure in the renewal category in Transend's original proposal was due to eight substation redevelopment projects that involved (among other things) the replacement of Reyrolle OS10 circuit breakers. Capital expenditure in the next period on these projects amounted to \$91 million or 40% of Transend's proposed renewal expenditure.

Nuttall Consulting undertook a review of seven of the substation redevelopment projects involving the replacement of the Reyrolle OS10 circuit breakers.

The main findings of the review were that Nuttall Consulting was satisfied that *"the identified assets and associated issues are reasonable, and warrant consideration for their replacement"*¹. Further, Nuttall Consulting went on to say, *"noting the age and issues of the relevant assets, we consider it reasonable to assume that Transend will need to undertake some 110 kV substation redevelopments to meet the capex objectives"*².

However, Nuttall Consulting considered that Transend had not *"demonstrated the need to undertake the volume of redevelopments it is proposing, particularly the large number in the last 2 to 3 years of the next period"*³, and *"more detailed evaluations of the projects should allow a number of the redevelopments to be prudently deferred by 1 to 3 years, such that the "as-incurred" costs of these redevelopments will fall outside the next regulatory period"*⁴.

The view here was that the application of Transend's governance processes would result in some further optimisation of these plans, particularly given that these redevelopments were proposed to be commissioned in 2013/14 or 2014/15. On the balance of the information available, Nuttall Consulting considered that 60% of the expenditure proposed would be required to prudently and efficiently satisfy the capex objectives.

The overall findings were based upon two main views. The first concerned Nuttall Consulting's view that Transend had not adequately demonstrated the risks associated with the existing assets. In particular, Nuttall Consulting considered that there was insufficient *"quantitative information to gauge their significance on the need for a replacement"*⁵. With regard to safety issues, which appeared to be a significant matter in Transend's view of the need to undertake the redevelopments, Nuttall Consulting considered that *"important information to appraise the significance of these risks is not provided. Such matters we would expect to be discussed include the history of these risks, how they have been managed to this period, and how they may change from existing levels in the short to medium term if the renewal option is deferred"*⁶.

The second matters concerned Transend's economic analysis, which Nuttall Consulting considered did not adequately demonstrate the prudence and efficiency of the selection and

¹ Pg 62, Nuttall Consulting renewal report

² Pg 63, Nuttall Consulting renewal report

³ Pg 63, Nuttall Consulting renewal report

⁴ Pg 63, Nuttall Consulting renewal report

⁵ Pg 61, Nuttall Consulting renewal report

⁶ Pg 61, Nuttall Consulting renewal report

timing of the preferred option. In particular, Nuttall Consulting considered that “*Transend has adopted a worst-case scenario, whereby it has assumed that a substation failure will occur in the year following the deferral date*”⁷. Furthermore, Nuttall Consulting noted that a large level of unmodelled risk would be required to justify that the proposed timing was efficient, and it was not evident from the information provided that this level of risk existed⁸.

Nuttall Consulting also considered that the consultation required on these projects could result in some delays, and particularly noted the Tungatinah redevelopment, which required the acquisition of land from the associated customer, Hydro Tasmania.

It is also important to note that Nuttall Consulting considered that it was appropriate to expect Transend to demonstrate that the scale and timing of its substation development plans was prudent and efficient. This view was based upon the large level of proposed expenditure on these projects over a short timeframe and the findings of Nuttall Consulting's benchmarking of the average age of Transend's 110 kV circuit breaker population due to this plan. This benchmarking indicated a significant reduction in the average age of the population due to the plans, and a resultant young population compared to the existing age of its peer TNSPs. Nuttall Consulting considered that this suggested that Transend's compressed timescale for the substation redevelopments may be overly aggressive.

Nuttall Consulting considers that this requirement for the reasonable demonstration of the prudence and efficiency of these developments is in line with the AER's views on this matter, and consistent with the AER's approach in the recent SP AusNet revenue decision.

3.2.2. Summary of Transend's revised proposal

In Transend's revised proposal it disagrees with Nuttall Consulting's recommendation (and the AER's draft decision) and proposes the complete reinstatement of the expenditure on substation redevelopments as in its original proposal.

Transend's revised proposal addressed two main matters raised in the AER's draft decision. The first concerns the age benchmarking Nuttall Consulting undertook on Transend's 110 kV population. On this matter Transend states: “*Nuttall Consulting appears to place weight on the mistaken belief that Transend is compressing a 10-year Reyrolle OS10 circuit breakers replacement program into a shorter period. However, this is an ongoing program, which will extend into the 2014–19 regulatory control period. The Nuttall Consulting analysis also appears to place inappropriate weight on the importance of average asset age. While asset age may indicate a need to replace or renew assets, Transend's asset renewal programs are not predominantly age-based*”⁹.

The second matter concerns the economic analysis supporting its original proposal, whereby Transend stated that it has undertaken further economic analysis to provide a more

⁷ Pg 62, Nuttall Consulting renewal report

⁸ See discussion on Pgs 62 and 63 of the Nuttall Consulting renewal report

⁹ Pg 37, Transend revised proposal

comprehensive assessment of deferral options. Transend considered that this revised analysis “confirms the appropriateness of the original planned replacement program”¹⁰.

Transend also notes that it considers its “replacement strategy is supported by information from other Australian and New Zealand TNSPs, who completed replacement of all Reyrolle OS10 circuit breakers some years ago, responding to similar drivers to those experienced by Transend”¹¹.

In addition to the above, the Transend proposal also states that it has undertaken a “risk review” on the assets included in the substation redevelopment projects¹² - although details and findings from the risk review are not provided in the revised proposal.

The proposal also included:

- revised Investment Evaluation Summary (IES) documents for each redevelopment project¹³; and
- summary details on the 110 kV circuit breaker replacement program, 110 kV substation redevelopment plans, and information on other assets due for replacement within the redevelopments¹⁴.

3.2.3. Nuttall Consulting review

In Nuttall Consulting's opinion, Transend's revised proposal (and associated information) supports a greater level of expenditure than allowed for in the AER draft report. It is however clear that further optimisation of Transend's plans is likely through the application of Transend's governance processes. Nuttall Consulting is recommending a 20% reduction to the forecast capital expenditure on the substation redevelopments contained in Transend's revised proposal.

The following sections detail our review and analysis supporting this finding.

As stated in our original report, we agree with Transend that many of the assets associated with the substation redevelopments are old and showing signs of advanced aging. On this basis, it is entirely reasonable that these assets should be considered in Transend's forward replacement plans.

Nevertheless, Nuttall Consulting considers that Transend has not provided sufficient justification for the revised substation redevelopment expenditure, and specifically that the information provided does not demonstrate that the expenditure is at the prudent and efficient level to satisfy the NER's capital expenditure objectives. Moreover, we consider that the information provided by Transend supports our view that further optimisation of these plans can be achieved.

The two main matters that support our findings on the substation redevelopments relate to:

- risks associated with the existing assets, including

¹⁰ Pg 37, Transend revised proposal

¹¹ Pg 38, Transend revised proposal

¹² Pg 9, Appendix 5, Transend revised proposal.

¹³ Attachments to Appendix 5, Transend revised proposal

¹⁴ Provided in various sections in Appendix 5.

- Transend's risk review, and
- Transend's change to its Reyrolle circuit breaker replacement timing; and
- the revised economic evaluation of renewal options.

These two matters are discussed further in the sections below.

Before turning to these matters, the following points are considered important:

- As noted above, Transend's revised proposal discusses Nuttall Consulting's benchmarking of Transend's 110 kV circuit breaker fleet, and relates this to Nuttall Consulting's view on various matters. As also noted above, the primary use of the findings of Nuttall Consulting's benchmarking was to support its (and the AER's) view that Transend should adequately demonstrate the prudence and efficiency of its substation redevelopment plans. As such, we do not consider that this matter needs to be addressed further in this report.
- Transend's revised proposal contains information on general asset issues in Appendix 5, and specific project matters within the project Investment Evaluation Summaries (IES) attached to Appendix 5. It is important to note that this is largely information already provided to and reviewed by Nuttall Consulting during its original renewal review. As such, Nuttall Consulting does not discuss the detail of this information here. Although, it is important to appreciate that this information has been considered in our on balance findings.
- Transend has raised asset concerns relating to some substations during the course of our review¹⁵, including:
 - the poor condition of the supply transformers at Arthurs Lake and the related environmental issues;
 - the safety concerns related to the Tungatinah development;
 - the Sprecher and Shuh breakers, which are part of the proposed Burnie redevelopment; and
 - the poor condition of CTs at Burnie.

It is important to stress that Nuttall Consulting does not dispute any of these matters, and it may well be that these factors result in these substation redevelopments, or elements of, having a greater probability that they will be deemed necessary during the next period. Nonetheless, Nuttall Consulting considers that the recommended allowance is still sufficient for Transend to determine how to address the range of needs, including these matters. As such, within the context of this review, we do not consider that we need to recommend an allowance to address specific items within the substation redevelopments.

- In its original report, Nuttall Consulting commented that the required consultation may delay some redevelopments, and noted that the land acquisition negotiations with Hydro Tasmania required for the Tungatinah redevelopment made this a candidate for such delays. Transend has advised¹⁶ that it considers the 3 years to the

¹⁵ Discussed during on-site meeting with Transend, with further information in Transend emails, dated 25/2/09

¹⁶ Transend email, dated 26/2/09

commencement of the Tungatinah project is sufficient to resolve these matters, even if a compulsory acquisition order is required. Nuttall Consulting agrees that this is the most likely outcome; however, we still consider that there is a material probability that matters could be delayed, particularly if Hydro Tasmania decides to vigorously oppose the acquisition. We still consider that this matter is important to note in the AER's deliberations on the overall capex allowance.

- Transend has advised that it does not consider any assets involved in the Tungatinah redevelopment will be considered a negotiated service. The basis of this view relates to its understanding of the National Electricity Amendment (Cost allocation arrangements for transmission services) Rule 2009 No. 3, which Transend considers confirms that replacement or reconfiguration of the assets providing prescribed connection services to Hydro Tasmania at 9 February 2006 will be grandfathered as providing prescribed services. Nuttall Consulting understands that the AER does not agree with Transend's interpretation of this amendment. For the avoidance of doubt, Nuttall Consulting has not made any specific adjustment to account for this matter.

3.2.3.1. Asset risks

It is clear from the information provided by Transend, in support of its original and revised proposals, that the risks associated with existing assets are the main factors Transend considers are driving the need for the substation redevelopments.

These risks drive the timing of the projects in a broad sense, with other matters associated with coordination between projects and programs driving the specific timing defined within the revised proposal¹⁷.

The risks cover a range of possibilities, with the most significant defined by Transend relating to the failure of the assets resulting in market/operational impacts (e.g. load shedding or constrained generation) and safety issues. These risks are associated with a range of assets and include issues related to asset age, condition and performance, spares availability and product support.

Nuttall Consulting considers that these risks are valid and that they support Transend's overall strategies to replace these asset types and the substation redevelopment program. This position is consistent with Nuttall Consulting's original report and was a significant consideration in our *on-balance* position that the majority of Transend's substation redevelopment expenditure was justified in the next period - even though we considered that the risks had not been fully demonstrated and the economic analysis did not appropriately justify the timing of any projects reviewed.

Nuttall Consulting considers that the new information provided by Transend to support these risks still does not completely justify the substation redevelopment program as proposed by Transend. However, Nuttall Consulting does consider that the new information supports a revised expenditure on substation redevelopments above that recommended in Nuttall Consulting's original report.

¹⁷ Refer to "project timing" sections in the project IES that are provided as attachments to Appendix 5 of the revised proposal.

In the sections that follow, we set out our review of the information provided by Transend associated with the asset risks, covering:

- the asset risk review, which was undertaken by Transend following the draft decision in order to demonstrate the risks associated with the existing assets planned for replacement, and
- Transend's change in its Reyrolle circuit breaker replacement strategy, which was due to additional defects of this breaker type that were determined following the AER's draft decision.

3.2.3.1.1. The risk review

Transend's risk review purpose and form

A major concern of Nuttall Consulting in its original review was that risks associated with existing assets appeared to be the main factor driving the need for the substation redevelopments; however, Transend had not demonstrated these risks sufficiently to justify the scale of the redevelopments in the next period¹⁸.

Nuttall Consulting understands that in response to this matter (and following the AER's draft decision), Transend conducted an evaluation of the risks associated with the assets in each bay containing a Reyrolle OS10 CB. This evaluation is called the "risk review" in Transend's revised proposal and in this report. Transend's revised proposal states that this review is:

"[a]n objective assessment of the risks presented by each of the assets included in the 110 kV substation redevelopment projects has been undertaken. This review considers asset condition, consequence of failure (safety, environment, failure consequence costs, and operational consequences) and transmission circuit criticality.

...

The methodology used to determine the risk is consistent with risk assessment models used both locally and internationally among electricity utilities."

The details and findings of the risk review were not provided with Transend's revised proposal, and therefore, the AER requested further information from Transend¹⁹. Transend provided reports discussing the risk review methodology and spreadsheets detailing both the risk analysis and the circuit criticality assessment²⁰.

To aid in the understanding of the discussion on Nuttall Consulting's assessment of the risk review, the following is an overview of Transend's methodology applied in the risk analysis associated with the risk review.

The risk review adopts a circuit approach, evaluating the risks associated with the individual substation circuits involving the Reyrolle OS10 circuit breakers. Each circuit is evaluated in

¹⁸ Pg 62, Nuttall Consulting renewal report

¹⁹ AER email, dated 23/1/09

²⁰ Provided in data pack attached to Transend email, dated 2/2/09

terms of five asset types within the substation circuit, namely the circuit breaker, disconnectors, VTs, CTs, and protection.

The output of the risk analysis is a quantitative risk score – importantly, not an economic value. The risk score for each circuit is calculated as follows:

$$\text{Risk score} = \text{Likelihood} \times (\text{consequence} + \text{criticality})^{21},$$

where *likelihood*, *consequence* and *criticality* are themselves quantitative scores developed through the risk review formulation.

The likelihood score is calculated for each of the five asset types in each circuit. These likelihood scores are then weighted and summed to produce an overall likelihood score for each circuit.

The asset level likelihood score is calculated as a function of a number of parameters. These parameters are based upon Transend's view of the electrical condition, design issues, life expectancy, number of units and failure rate of each asset in the circuit²².

The consequence score relates to Transend's ability to manage and maintain a safe and secure transmission network in the event of a failure. The consequence score is calculated at an asset class level i.e. a consequence score is not derived for each individual circuit as with the likelihood score.

To determine the score, each asset (of the above asset types) is assigned a score based upon 4 separate consequence factors:

- Safety;
- environmental;
- cost – which relates to collateral damage and incidental costs associated with a failure; and
- operational – which relates to the ability to manage operational constraints due to the assets and the impact of failures on interruptions to supply.

The scores associated with the four consequence factors assumed for each asset type are then weighted and normalised to produce a single consequence score of up to 5 for each circuit.

A criticality index of 1 to 5 has been developed for each circuit. This index is derived from a criticality score developed for each circuit. This score is derived from five factors, which sum to produce the criticality score for each circuit. These factors are:

- NEMMCO oversight - Transend assumes a score of between 1 and 40 depending on the level of oversight NEMMCO has on the circuit – a score of 40 relates to direct oversight by NEMMCO.

²¹ It is worth noting that both *consequence* and *criticality* are what would normally be termed consequences in a formal risk assessments. Transend uses different terms to distinguish different outcomes.

²² The failure rate used is the historical failure rate for the Reyrolle circuit breakers. This failure rate is assumed for the other asset types; although this is essentially adjusted via the weightings. The circuit breaker is given the highest weighting (approximately 36%).

- Maximum demand – which Transend scales by approximately 50% to produce a score.
- Radial load circuit – which are given a score of 10 due to the definite interruption of supply on failure for a radially supplied load.
- Bus couplers – which are given a score of 40 due to the potential for a greater impact on failure.
- Transformer circuits – which are given a score of 10 due to their role in protecting high value power transformers.

The index is produced from these scores as shown in the following table.

Table 1 Transend's criticality index

<i>Index</i>	<i>Score</i>
5 (most critical)	> 50
4	> 40 and ≤ 50
3	> 30 and ≤ 40
2	> 20 and ≤ 30
1 (least critical)	≤ 20

It is worth noting that Transend's revised proposal assigns a large number of the circuits containing the Reyrolle breakers with a criticality index of 4 or 5 (66% or 35 breakers)²³.

The overall output of Transend's risk review, plotted in terms of likelihood versus (consequence + criticality), can be seen in Figure 1 below.

Nuttall Consulting review

Nuttall Consulting has reviewed the additional information provided by Transend concerning its risk review.

With regard to appreciating the form of Transend's risk review, two matters are important. Firstly, Nuttall Consulting does not consider the risk review to be a formal risk assessment, in accordance with risk management standards such as AS/NZS 4360:2004. That is, it does not appear to involve the full formal process defined in such standards. For example, the Australian standard includes specific stages to establish the context of the review and then identify, analyse, evaluate and consider the treatment of the risks. Transend's risk review only involves the quantitative analysis of risks.

Secondly, it is noted that Transend has described the methodology as being consistent with that applied by local and international electrical utilities. Nuttall Consulting understands this qualification to relate more to the overall risk analysis approach of calculating risks in terms of likelihoods and consequences associated with electrical assets, rather than the internal formulation of the model being accepted and applied across the industry. That is, the spreadsheet model used and the specific formulation within this model appear to be

²³ Section 1.5.1 of Appendix 5, Transend revised proposal

developed in-house, and, as far as Nuttall Consulting is aware, it is not a standard model/application used across the industry²⁴.

Due to the concerns expressed in the original Nuttall Consulting report on the limitation of the quantification of the risks, we consider that the above points are important for the AER's appreciation of the form of the risk review that Transend has conducted.

Nuttall Consulting still considers that a risk analysis of this form has merit in the asset management process and in the quantification of risks associated with the substation redevelopments. However, based upon our review of the model inputs and documentation provided, Nuttall Consulting has a number of concerns as to whether the outputs of the model can be relied upon to support Transend's position – i.e. that the risks fully justify the proposed timing of the substation redevelopments. These concerns related to three main matters:

- the validation of the model;
- the economic value of risks - it was not possible to gauge the relative significance of the risk scores provided as outputs to the model (i.e. the relationship between the risk score and the economic value of the risks); and
- inconsistent treatment of failure likelihoods and consequences - a lack of consistency between the failure likelihoods derived for each circuit and the various consequences of failure (e.g. safety, environmental, etc), which could in turn bias the resultant risk scores.

These concerns were discussed with Transend. Transend confirmed that it had not conducted a formal validation of the model; however, it considered that the model had been developed by appropriately qualified and experienced staff, and so was reasonable. Subsequent to the discussion of these concerns, Transend agreed to:

- provide a comparative risk analysis for one of the other breaker types that are planned to be replaced in the period after the next (i.e. a breaker type Transend considers will not need to be replaced in the next period); and
- reassess the model and provide further information on the basis of the inputs to the analysis, and relationship between the likelihood and consequence of individual assets and consequence factors.

Transend has provided further documentation and analysis on these matters²⁵. Nuttall Consulting had reviewed this information, and still has concerns with the consistency between failure likelihoods and consequences.

Our concerns stem from the methodology applied by Transend in calculating risks. This does not consider the various modes of failure of each asset and the associated consequences of each mode of failure, which would then normally be used to derive the likelihood of this consequence occurring due to the failure mode. Instead, the Transend approach considers only one unstated failure mode that appears to relate to an extreme event.

²⁴ It is worth noting that, as far as Nuttall Consulting is aware, such a standard risk model/application used across the industry does not exist, and therefore, no inference should be drawn from our views expressed here to the contrary.

²⁵ Provided in Transend email, dated 26/2/09

Moreover, the model assumes a single likelihood value for each asset type in a bay, which is then assumed to be the likelihood applicable for the four consequence factors (safety, environmental, cost and operational) and the criticality factor. Therefore, it is imperative that the consequences are appropriately scaled to match the single likelihood if there is to be an equivalence of risks between assets and consequence factors²⁶. Transend does apply a weighting to the consequence score; however, Nuttall Consulting does not consider that this adequately accounts for the above matter.

These specific matters were discussed with Transend when Transend agreed to provide further information. The new information provided by Transend does not appear to have provided any further specific explanations to address these matters. As such, Nuttall Consulting still has concerns that the risk analysis is flawed, and as a result may overstate the risks and not correctly apportion risks between the various assets and consequences.

The following provides an example²⁷ of our concerns on this matter. The Reyrolle circuit breakers account for the majority of asset risks (approximately 45%) and the risk model assumes safety risks are equivalent to operational risks for these breakers. This results from the model assuming an equivalent consequence score between safety and operational risks associated with a circuit breaker failures - as the same likelihood is applied to both factors, the safety and operational risks associated with circuit breakers are equivalent. Further, environmental risks are considered to be relatively high, at approximately 60% of the operational risks for similar reasons (i.e. the environmental consequence is approximately 60% of the operational consequence).

In Nuttall Consulting's opinion, these assumptions may significantly overstate the safety and environmental risks in two ways.

The first potential for overstatement relates to the simplification within the model to allow only one failure mode to be modelled. The majority of defects/failures associated with the Reyrolle circuit breaker may have operational consequences associated with an outage of the affected bays; however, these more typical failure modes should not have safety or environmental consequences. As such, the highest likelihood failure mode – which the likelihood value within the model is largely derived from – is not modelled in a direct way.

The second potential for overstatement concerns risks associated with a more catastrophic failure mode of the circuit breaker. This appears to be the basis of the risk model. Nuttall Consulting accepts that catastrophic failure could result in similarly valued operational and safety consequences. However, the likelihood of these two consequences is significantly different. To achieve the modelled safety consequence, personnel would need to be in the close vicinity of the circuit breaker at the time of this failure mode. The likelihood of personnel being in close proximity to a breaker at the time of a catastrophic failure is not the same as the likelihood of catastrophic failure, and should be significantly less. To correct for this inaccuracy, either the consequence would need to be scaled to account for the single likelihood value in Transend's formulation, or the model would need to be altered to allow different likelihoods to be derived for the four consequence factors.

²⁶ This point on the potential for inconsistency is discussed in Section 3.4.4 of the Australian Risk Management standard, AS/NZS 4360:204, concerning semi-quantitative analysis.

²⁷ It is important to note that this only discusses examples of our concerns, and should not be interpreted as a complete set of issues. Such a set could only be developed from a more formal appraisal of failure modes and effects of these assets.

Nuttall Consulting considers that similar issues to those described above would equally relate to the risks associated with other substation assets. For example, protection is given a higher safety consequence than operational consequences; however, we would expect the likelihood of an adverse safety consequence occurring being significantly lower than the operational/market consequences²⁸.

With regard to the relatively high circuit breaker environmental risks compared to operational risks, we are also unsure why this would be the case for these circuit breakers even for a catastrophic failure. Transend's condition assessment report for these breakers states that²⁹:

“Reyrolle circuit breakers contain 700 litres of insulating oil however the units do not present any significant environmental risks.”

On this matter, we consider that there is also scope for the cost consequence factor to overlap with the environmental factor within the model, in that the costs associated with collateral damage and general clean up may be largely indistinguishable from strict environmental only costs for these assets.

Finally, there appears to be the potential for the overlap between risks due to the criticality factor and operational consequences, which both appear to account for market based costs (e.g. interrupted supplies).

Based on the above, we do not believe that the risk review adequately addresses the concerns that Nuttall Consulting expressed in its original report including:

- the lack of substantiation of the scale of risks not accounted for in the economic analysis, and
- information on how these risks are or could be managed.

Although, based upon our discussions above, we consider that the risks associated with operational/market consequences, particularly those associated with the circuit breaker should form a large proportion of the circuit risks. This point has some relevance to our later discussion on the economic analysis.

Allowing for the limitations in the risk review, we consider that the output of the risk review still provides a useful relative gauge between the risks associated with substation circuits under review and other circuits whose risks are considered acceptable by Transend.

The following figure provides a graphical representation of the outputs of Transend's risk review. This information was provided by Transend³⁰ to support the substation replacement strategy following the AER's draft decision. The figure highlights the range of risks attributed to each substation bay in terms of the consequence and likelihood.

²⁸ That is, it is much more likely that the failure of a protection system will result in back-up protection isolating the fault. This may result in a wider part of the network suffering the outage, but should not result in a significant safety risk.

²⁹ Pg 8, Transend document, Reyrolle Type 110/OS 110 kV Circuit Breaker Condition Assessment Report, August 2008, TNM-CR-809-0772.

³⁰ A4_D08_88036 - Risk Matrix 110 kV Substations, provided with Transend email, dated 2/2/09.

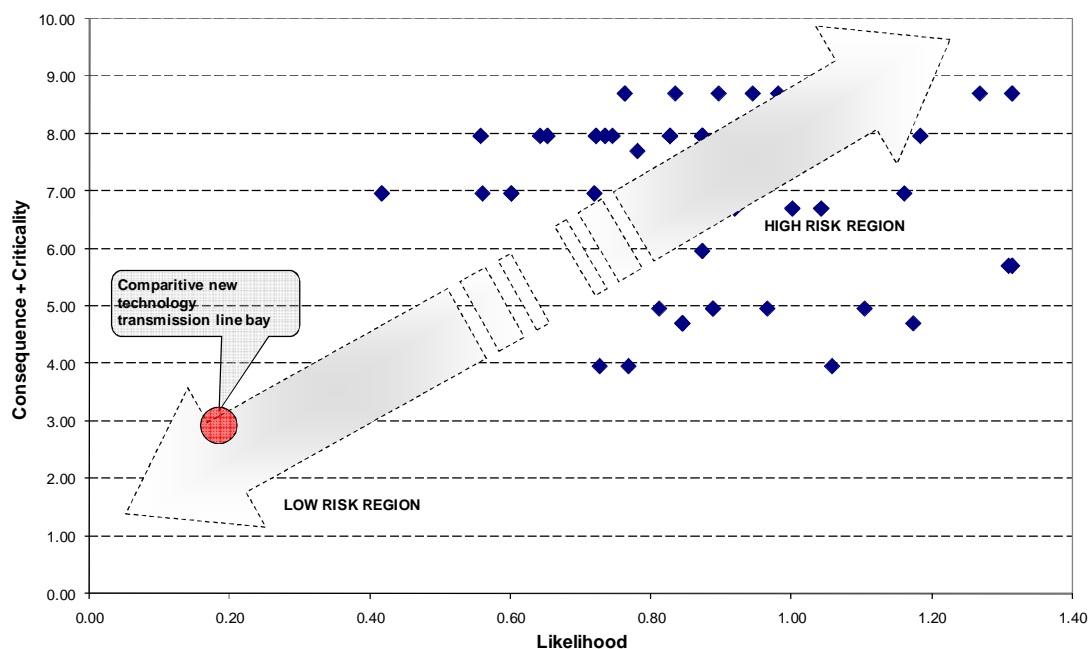


Figure 1 – Risk Matrix 110 kV Substations

Nuttall Consulting notes that the illustrative arrow on the Transend figure suggests that the consequence and likelihood increase for assets as they age. Although this is generally true for likelihood (i.e. the older the asset the more statistically likely it is to fail), it is not typically true for consequence.

As discussed previously, the information provided in the above figure is an important part of determining the replacement strategy. However, as the likelihood and consequence rankings are relative, it is not possible for Nuttall Consulting to assess these risks with those of the general Transend asset population.

As noted above, to aid in this assessment, Transend provided Nuttall Consulting with additional information that highlighted the relative position of existing substation circuits that were not included in the above assessment. This information is provided in the following figure, based upon a revised figure provided by Transend.

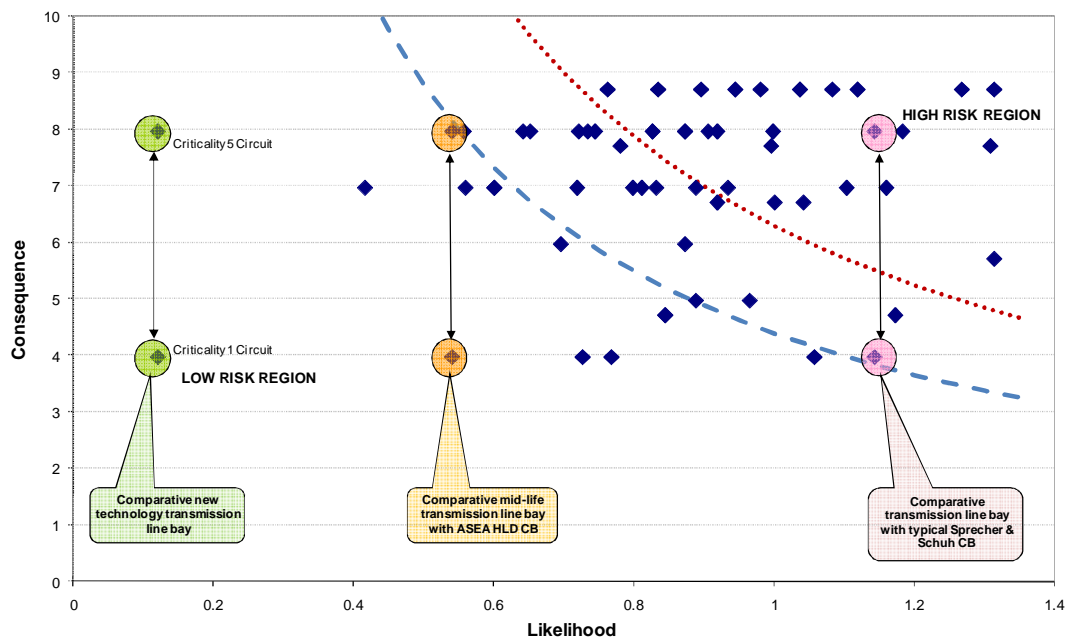


Figure 2 - Risk Matrix with reference points

The above information highlights the relative risk positions for three selected substation circuits as provided by Transend:

- a new substation circuit based on modern technology assets (green – left hand side);
- a mid-life substation circuit using an ASEA HLD circuit breaker as reference (orange - centre); and
- an older style line bay with a Sprecher & Schuh circuit breaker (pink – right hand side).

Nuttall Consulting has also added a line indicating an “acceptable” risk contour as defined by the dashed blue line³¹. This contour line is based upon the risk associated with the example mid-life circuit breakers. As these mid-life circuit breakers are not planned for replacement within the forecast regulatory control period they provide a benchmark for the level of risk that Transend considers as acceptable.

Further, Nuttall Consulting has also added a “moderate” risk contour based upon the risks associated with the average Reyrolle bay (the red dotted line). This contour line is based on the mid-point of all the 110 kV Reyrolle line bays with a similar number falling above and below the line.

Figure 2 provides the following information:

- 10 bays appear to present no greater risks than other bays not considered for renewal during the next period. In other words, these bays represent less risk to Transend than the worst of the ASEA HLD circuit breakers that are not proposed for replacement until after the next regulatory control period.

³¹ The contours represent a position of equal risk. Risk scores lower than the contour risk are to the left and below the contour lines.

- The spread of risk is relatively broad, with a further 17 bays appearing to be in a low relative risk position to the higher risk bays. The consequence rankings range between 4 and 10, and the likelihood rankings range between 0.4 and 1.4.

The information provided by Transend in the risk matrices clearly identifies that 10 of the substation bay replacements proposed for completion in the next regulatory period represent a risk that is considered acceptable by Transend in other circumstances. Moreover, due to the broad spread of risks, a large number of substation circuits have risks that are closer to the acceptable risks than the highest risk circuits.

The following figure provides a breakdown of the major substation locations on the risk chart. The information is the same as the previous risk matrix, except that the axes have been adjusted and the markers modified for easier presentation of the information.

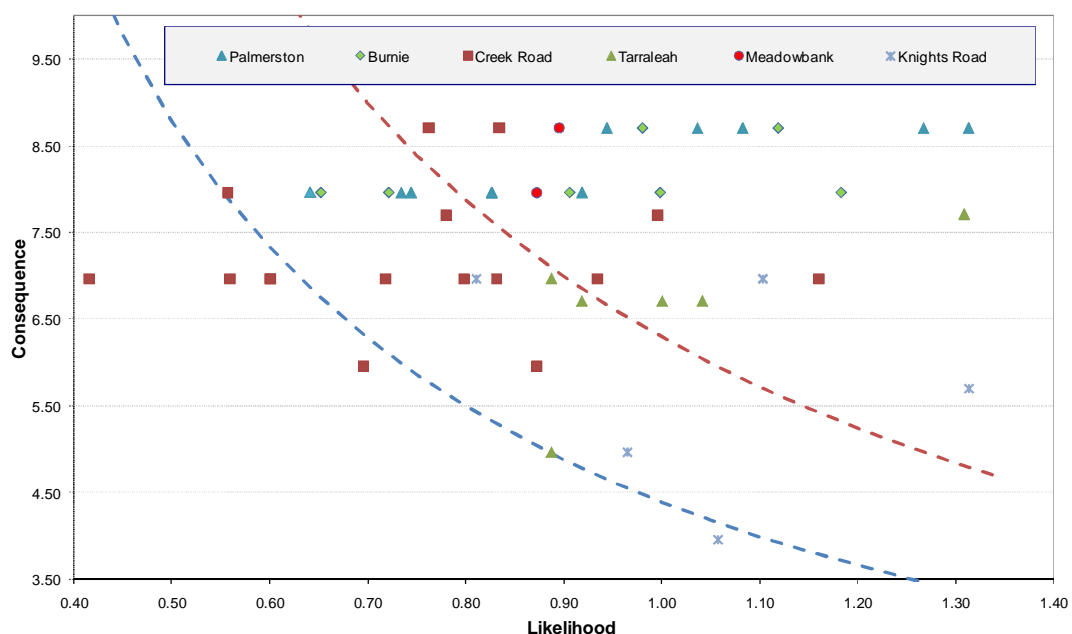


Figure 3 – Risk matrix substation breakdown

The above analysis shows that Creek Road (the square maroon markers) and Knights Road (the blue cross markers) have a large proportion of bays with risk scores less than the “acceptable” and “moderate” risk contours.

Palmerston (the blue triangle markers), on the other hand, has a large proportion of its bays in the higher risk region.

Nuttall Consulting considers that this assessment of the relative risks, which is based upon the risk results presented by Transend, supports the view that *some* redevelopment projects or elements of these projects could be deferred by a *small* amount without accepting a level of risk that is higher than Transend is accepting in the timing for other bay renewals. These results also suggest that bays within Creek Road and Knights Road have the greatest potential for some deferral.

3.2.3.1.2. Change in Transend Reyrolle OS10 replacement strategy

Following the commencement of this review, Transend advised of an additional 12 defects associated with the Reyrolle OS10 fleet, which had largely occurred since Nuttall Consulting's original review³².

Importantly, Transend has advised that one major defect of a Creek Road circuit breaker involved the failure of three separate turbulator plates within the turbulator assembly, which also resulted in undetected fragments of material floating loose within the circuit breaker. Transend considers this issue to be new and serious, as it has the potential to lead to an explosive failure of the units with resulting safety consequences and the potential for major outages.

Subsequently, Transend advised that it was revising its timeframe for the replacement of the Reyrolle circuit breakers from 5 to 10 years stated in the associated condition assessment report to "as soon as practical"³³. The need for this revised timeframe related to new information including:

- the new potential failure mode found in the Creek Road circuit breaker, and the serious consequences which may result from this across the fleet;
- the fault levels at Creek Road and Tarraleah, which were assessed as 86% and 88% of the breakers capability and forecast to increase following other works in the region, imposing risks to their safe operation due to their deteriorated condition;
- increasing defect rates and defect costs of the fleet; and
- industry practice, where Transend noted that "*all other transmission utilities throughout Australia have either replaced or are in the process of replacing this type of breaker for drivers that are no different to Transend's*".

With regard to the last point on industry practice, it is important to state that Nuttall Consulting noted this matter in its original report. It is also important to state that this very factor is a significant consideration in Nuttall Consulting's on balance position. This position is that Transend's need to replace these breakers is justified, and it will be prudent and efficient to replace the majority of these breakers in the next period – even in the absence of a full economic and risk assessment at this time. As such, we do not consider that this information alone represents a sufficient case to alter our original recommendations.

Due to the significance of the other matters, which Nuttall Consulting considers are new, Nuttall Consulting requested further clarifications from Transend³⁴, which are summarised below:

New explosive failure mode

- Transend advised that it was assessing its immediate management requirements for the remaining fleet. The assessment has commenced with an aim of finalising outcomes before the end of May 2009. It will involve the review of the current

³² Transend email, dated 29/1/09

³³ Transend email, dated 25/2/09

³⁴ Nuttall Consulting email, dated 26/2/09, and Transend response in email, dated 3/3/09

maintenance practices and frequencies associated with the breakers, and include consultation with key stakeholders, including Transend’s maintenance provider.

- With respect to most likely management actions to ensure the safe operation of these breakers prior to replacement, Transend has stated that potential control measures could be to increase the turbulator inspection frequency to verify each phase of each circuit breaker, possibly from every 6 years to every 2 years - noting a cost of \$7,000³⁵ per circuit breaker inspection. Transend also stated that operational restrictions may be imposed under certain circumstances as a further control measure.

Increasing defect rates and costs

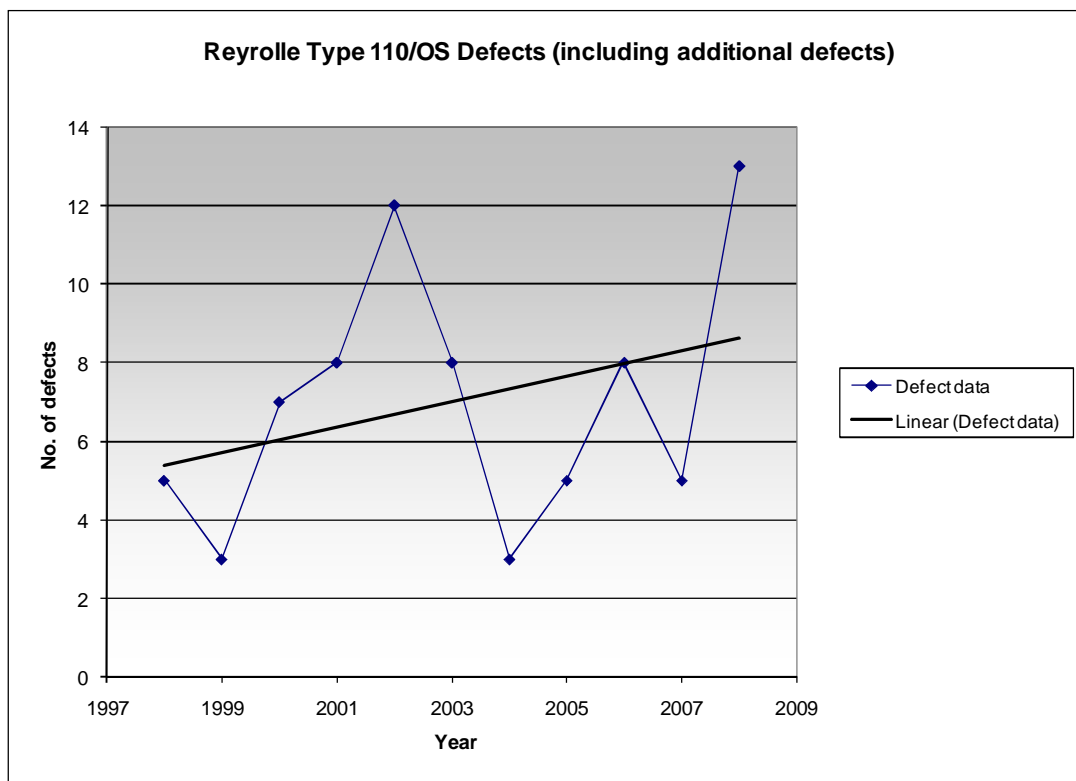


Figure 4 Transend’s analysis of defect rates

- A further 12 defects have been identified by Transend in its maintenance records – this is in addition to the 12 new defects noted above. Transend’s analysis of the complete set of defects indicates a rising defect rate – see Figure 4 above.
- This defect rate appears to show a 6 year cyclic pattern; however, Transend did not consider that there was a correlation between maintenance cycles (some are 6 yearly) and the defect numbers.
- Transend considered that whilst average defect costs were not increasing significantly, the cumulative increase in the number of defects was leading to overall increasing defect costs. Transend also considered that defect costs associated with the most extreme defects were increasing, and noted a recent compressor failure at

³⁵ This excludes internal coordination costs and the impact on the performance incentive scheme.

Meadowbank that had resulted in costs of \$9,651 to repair, which Transend considers is significantly greater than the average cost of a defect.

Fault level issue

- The fault level at Creek Road is forecast to increase by a further 7% following the Waddamana-Lindisfarne 220 kV line development; Tarraleah should remain unchanged.
- Other developments are not expected to materially increase fault levels further.

Nuttall Consulting recognises the validity of the new failure issue, and accepts that this may pose a significant safety and operational risk to Transend. However, based upon the above, it appears that Transend should be able to manage this matter in an operational manner without increasing safety risks significantly. Nevertheless, Nuttall Consulting agrees that there will most likely be costs associated with these operational and maintenance controls.

Furthermore, Nuttall Consulting expects that risk controls, such as those related to the new safety issue, will reduce the risks associated with the high fault levels at the Creek Road and Tarraleah substations (i.e. the controls will reduce the risk of explosive failure or reduce the likelihood that personnel will be in the vicinity at times when fault levels are high).

It is also important to note that Creek Road and Tungatinah are major substation redevelopments that Nuttall Consulting understands are not able to commence until after the Waddamana-Lindisfarne 220 kV line augmentation, and so are unlikely to be able to be completed until the end of the next period. As such, it appears that Transend will still need to impose controls on many breakers for some time, whether or not in response to the new turbulator failure issue.

With regard to the increasing defect rates and costs, Nuttall Consulting considers that Transend's analysis does not demonstrate that defect rates or costs are increasing in a significant way. The increase in defect rates shown by the Transend trend line is as much a consequence of the cyclic profile, as evidence that a significant increasing defect rate has occurred.

For example, a chart based upon a 6-month spread of defects shows a reduced trend from that indicated by Transend's analysis³⁶ – see Figure 5 – indicating only an increase of 1.6 defect per annum over the 10 year period, as opposed to Transend's increase of approximately 3.0 per annum over the same period. Moreover, the number of defects in the last 5 year period (2004-2008) is 33 compared to 38 in the 5 year period prior to that (1999-2003), which indicates an overall reducing defect rate.

³⁶ Nuttall Consulting has reduced by one the number of defects in 2008 as indicated in the Transend data to account for the defect that has occurred in 2009, but has been allocated to 2008 in the Transend data – see clarifying comment in Transend spreadsheet provided in email dated 3/3/09. Further, the date of the first defect record provided to Nuttall Consulting is July 1998. Nuttall Consulting has used the Jul-Dec 1998 period as its first point in its chart.

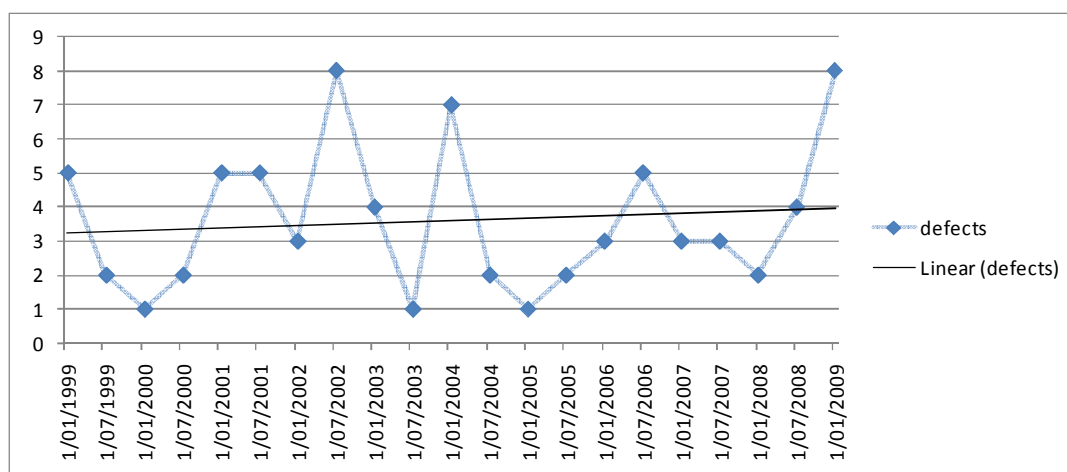


Figure 5 - Nuttall Consulting analysis of defects.

As much of Transend's argument for its view of the increasing defect costs relates to the increasing defect rate, Nuttall Consulting does not consider that position is fully justified either. It is also worth noting that based upon the economic analysis provided by Transend, the maintenance costs are unlikely to be the major determinant in defining the need for the renewal, as such, these could rise significantly, such as to allow for new safety control measures (e.g. revised maintenance schedules), before they may change the efficient timing of a redevelopment project.

Overall, Nuttall Consulting accepts that the new safety issue is significant, but these risks should be mitigated to some degree through new management actions. We do accept however that this still poses some level of additional risk, and as such, there is a case that Transend should be allowed an increase from that recommended in Nuttall Consulting's original renewal report.

However, noting that we do not consider that there is clear evidence that defect rates are increasing significantly, we do not consider that the information provided is sufficient to justify that all redevelopment projects must be undertaken as soon as possible.

3.2.4. Revised Economic analysis

Transend provided economic analysis to justify its substation redevelopments in its original proposal. In its original review, Nuttall Consulting considered that this analysis appeared to assume a worst-case failure scenario, and so, was biased toward the replacement options rather than defer options.

This was a significant consideration in our *on balance* position that there was a reasonable likelihood that some projects would be deferred by 1 to 3 years, following more detailed analysis.

Transend has revised its economic analysis to support its substation redevelopments in its revised proposal. The improvements in the revised analysis cover:

- the assessment of additional deferral options, involving staged developments with the replacement of the most critical assets undertaken in the first stage; and

- the use of *expected* failure risk costs, to address Nuttall Consulting concerns regarding Transend's use of the worst-case failure scenario.

Transend considers that its revised economic analysis supports Transend's preferred options, in that these options are the lowest NPV.

Nuttall Consulting still maintains that Transend's economic analysis does not fully support the timing of the projects or the selection of the preferred option, and still supports Nuttall Consulting's view that some redevelopments or part thereof could be efficiently deferred following more detailed economic and risk evaluations that we assume will occur through the application of Transend's documented governance processes.

This view is based on two main considerations. The first concerns the limitations in Transend's economic analysis. A strict interpretation of the analysis suggests that all projects could be deferred as the benefits in the reduction in maintenance costs and reliability risk costs do not outweigh the avoided capital cost of the renewal project. Moreover, the value of the unmodelled risk would need to be relatively high for most redevelopments to be considered optimal – significantly higher than the reliability risks that are modelled. Nuttall Consulting certainly accepts that a large amount of risks are not accounted for in the analysis; however, it has not been clearly demonstrated that these risks are at the scale required. As such, the timing of the projects is not supported by the analysis.

The second matter concerns Transend's new staged options. The staging assumed by Transend generally involves the replacement of large portions of the projects at the originally proposed time, based upon risks that still remain largely unquantified. Nuttall Consulting still maintains that a more rigorous assessment of the staging is likely to find more optimal staging for some projects. As discussed above, this view appears to be supported by Transend's own risk review, which suggests a broad spread of risks between the bays in many of the substations proposed for redevelopment.

We discuss our review of these matters in more detail below.

Unmodelled Risk

Transend has provided to Nuttall Consulting³⁷ spreadsheets of the revised economic analysis for each substation redevelopment project and a document detailing the Transend's analysis of the reliability risk costs. Nuttall Consulting has undertaken a high-level review of this material, and considers the overall methodology applied by Transend to be appropriate, in principle. Nuttall Consulting has noted some minor errors in the analysis, but we would not expect this materially to affect Transend's analysis or our findings.

A strict interpretation of the NPV analysis suggest that all projects could be deferred as annual maintenance costs plus risk costs do not exceed the avoided capital costs. The analysis provided suggests that the risks not accounted for in the analysis (unmodelled risks) would need to be in the order of 60-80% of the avoided capital costs to ensure the benefits of the renewal projects exceeded the capital costs, and as such, Transend's timing was justified.

The following figure provides an illustration of the modelled and unmodelled risks compared to the potential avoided cost of deferral.

³⁷ Transend email, dated 2/2/09

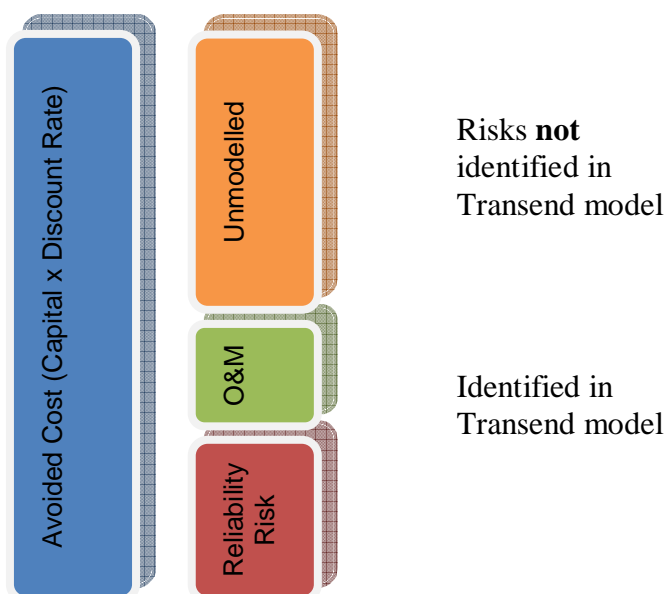


Figure 6 – illustration of unmodelled risk

Only Transend's analysis for the Palmerston substation redevelopment suggests that the modelled risks are relatively high, with only approximately 30% of unmodelled risks required to ensure the benefits outweigh the costs. Conversely, Creek Road, Meadowbank and Tungatinah are the worst, whereby the unmodelled risk costs would need to be around 85% or greater.

Clearly, Transend's view is that these unmodelled risks are indeed high, and much higher than the modelled risks (the reliability costs). Unfortunately, Transend's risk review (discussed above) has not attempted to address the economic value associated with these risks. Further, due to our concerns with the risk review discussed above, we do not consider that too much can be drawn from Transend's risk review results on this matter. Therefore, it is difficult to appreciate the relative level of unmodelled risks in the economic analysis.

Nuttall Consulting's assessment of the risk review suggests that operational/market costs must be a significant portion of the risk. However, Transend's reliability analysis indicates that most substation bays with a high criticality index have a low reliability cost associated with them. As there appeared to be a conflict between Transend's risk review and its reliability analysis on this matter, this issue was discussed with Transend³⁸.

Transend considered that the reliability analysis did not account for all matters concerning the high criticality bays as it did not appropriately account for the true market impact due to NEMMCO's system security obligations. As such, Transend's view was that, for these bays, its reliability analysis could significantly underestimate the expected value of reliability. Transend agreed to provide further information on the difference between the criticality index and the reliability analysis, and attempt to estimate the true value of reliability associated with a limited number (6) of high criticality bays³⁹.

³⁸ Discussed during on-site meeting with Transend

³⁹ A limited number of bays was selected as the analysis required to assess the security issues was considered more detailed than that undertaken in the reliability analysis.

The information provided by Transend, in response to the above agreement, states that the following system related matters, specifically related to system security and reliability, are not accounted for in its reliability analysis⁴⁰:

- risk of transmission circuit loss adversely affecting power system security;
- risk of immediate total or partial power system collapse;
- the impact of non-credible contingency events;
- the impact of operating parts of the power system with 'N' level of security for an extended period; and
- risk of the transmission circuit imposing constraints on the National Electricity Market that result in out of merit generation and increased pool price.

Transend also provided some discussion for each of the six selected bays on the specific conditions that could impact system security and reliability. This included a spreadsheet of the level of load that could be at risk for the listed condition for a Creek Road bus coupler circuit breaker.

Nuttall Consulting has reviewed this information and accepts that the value of reliability may be significantly underestimated for the high criticality bays. Unfortunately, as Transend has not attempted to estimate the economic value of this, even for the Creek Road bus coupler bay, it is still difficult to appreciate the scale of these risks.

Nuttall Consulting notes that the market consequences associated with system security considerations appear to require multiple contingencies or non-credible contingencies events. For example, in the Creek Road illustration: the three conditions provided in the Transend spreadsheet, each required the bus coupler to be out of service plus another failure of a breaker resulting in a “stuck” condition⁴¹. The likelihood of these conditions is extremely low. Based upon this, it is not clearly evident that these risks will account for the majority of the unmodelled risk.

In the documentation provided on this issue, Transend also listed the other factors that it considered were not accounted in its economic analysis. These covered:

- safety and environmental risks, particularly related to Arthurs Lake and Tungatinah, where Transend considered these may be high;
- risks presented by the other assets, that have not been accounted for in Transend's reliability analysis;
- impact of spares unavailability and procurement costs;
- internal costs associated with managing unplanned events;
- impact on service incentive scheme; and
- risks associated with Transend being deemed negligent in the event of an asset failure, particularly where it is in contravention of independent advice and its asset management strategies.

⁴⁰ Transend email dated 27/2/09

⁴¹ Transend's reliability analysis assumes a “stuck” breaker failure to only represent 1 in 10 major failures.

Nuttall Consulting agrees that these risks are not accounted for in Transend's economic analysis. However, based upon Transend's risk review and our views of this review, we would expect these risks to be lower than the operational/market risks discussed above. It is certainly accepted that for specific safety matters, such as Arthurs Lake and Tungatinah, the safety risks may be greater than at other substations. Nevertheless, generally across the substation redevelopment projects, it is still not clearly evident that the risks in all cases will be greater than the avoided capital costs.

Staged Options

In addition to the matter above on the possible deferral of some projects, Nuttall Consulting also has concerns with the staging options assumed in Transend's economic analysis. This concern relates to whether the assumed staging is optimal. In effect, a more optimal staging may have a lower NPV than Transend's preferred option.

Transend has assessed additional staged options in its revised proposal in order to address Nuttall Consulting's original view that the deferring of some elements of projects may be found to be efficient. The first stage assumed in the Transend's revised analysis involves the replacement of the higher risk assets, which covers those with significant safety issues and the bays with a high criticality index (the criticality index is based upon the analysis discussed in the risk review section above). The second stage involves the less critical bays, normally deferred by 3 years.

Nuttall Consulting accepts that the higher risk assets would be staged first. However, Nuttall Consulting considers that the criticality index can only be used as a first approximation of bay priorities. Similar to the issue of project deferral above, we would expect that a more detailed reliability analysis and project optimisation may elicit a more optimal staging and timing of the stages and bays in each stage.

For example, noting the description in Section 3.2.3.1.1 on the formulation of the criticality index, there is a relatively broad range of criticality scores that define the highest indices of 4 and 5 i.e. nearly 60% of the criticality score. Considering that the security issues generally require multiple contingencies or non-credible contingencies, and most of the substation under review have a large portion of high criticality index bays, it seems reasonable to consider that the renewal of the most critical bays may result in a relatively large reduction in the risk costs, even if some critical bays are deferred until the second stage.

Furthermore, Transend's risk review indicates that some bays with a criticality of 4 and 5, which would be programmed for the 1st stage in Transend's option, actually have significantly lower risks than other bays. Again, suggesting that the staging may not be optimal in terms of accounting for all risks.

Based upon the above, Nuttall Consulting still maintains that it is reasonable to assume that a modest deferral of some projects or elements of projects may be achieved following the more detailed economic analysis that will occur through the application of Transend's stated governance processes.

That said, noting the greater understanding of the unmodelled risks and the possibility for these to increase due to the further deterioration of the assets, Nuttall Consulting accepts that an increase in expenditure from the level proposed in its original report is warranted.

3.2.5. Conclusions and recommendations

Based upon our review of the information provided by Transend to support its proposed expenditure on the substation redevelopments under review, Nuttall Consulting still maintains that the expenditure required to achieve the NER capex objectives should be reduced from that proposed by Transend.

However, we consider that the new information presented by Transend on asset risks and the possibility of the further degradation of assets during the next period, does support the need for an increased amount from that provided in the Nuttall Consulting's original report (and the AER's draft decision), which amounted to a 40% reduction.

Due to the limitations in the information provided – which is partly to be expected considering the timing of these project in the latter half of the next period - it is not possible to be specific over the adjustments that are most likely at the project level. Nevertheless, on balance, we consider that a 20% reduction across the redevelopment projects associated with the Reyrolle circuit breakers should be achievable, following the more detailed analysis that should occur, in accordance with Transend's governance procedures.

The 20% reduction still allows for 2/3 of the substation redevelopments to be undertaken during the latter part of the next period, with the remaining 1/3 undertaken in the first 2 to 3 years of the following period. This differs from Transend's position, which proposed 82% to be undertaken in latter part of the next period, with the remaining 18% in the first 2 years of the following period.

Nuttall Consulting is not proposing specific elements of projects that this reduction relates to. However, as an example, such a reduction would be achieved by the deferral of Creek Road, Knight Road and Meadowbank by 1 year. These modest deferral would still result in all projects being completed by the 2nd year of the period after the next. Our assessment of the risk reviews and economic analysis suggests these small deferrals could be found to be prudent and efficient with more rigorous analysis.

3.3. Secondary Systems

3.3.1. Background and appreciation

Nuttall Consulting reviewed two projects in its original review concerning major renewal of secondary systems, namely:

- Farrell substation; and
- New Norfolk.

Nuttall Consulting recommended a 50% reduction to Transend's proposed expenditure, based upon the view that detailed analysis of the projects would result in the staging of the projects, allowing 50% of the capital expenditure to be deferred beyond the next period.

Transend's revised proposal states that it has undertaken more detailed analysis of the two projects and accepts that some capital expenditure can be deferred. However, Transend

considers that the extent of deferral is less than recommended by Nuttall Consulting, with a reduction of approximately 20% across the two projects.

Transend has not made any other similar adjustments to any of its other projects that include the replacement of secondary systems, other than the two identified through the Nuttall Consulting renewal review.

3.3.2. Nuttall Consulting review

Nuttall Consulting has reviewed the information provided by Transend to support its revised proposal and accepts that an increase from its original recommendations is warranted. However, Nuttall Consulting considers that a reduction of 15% on the expenditure in Transend's revised proposal should be applied across the two projects to account for the probability that some elements still will not be required following more detailed analysis.

The sections that follow summarise our review of each project.

3.3.2.1. Farrell

The revised scope of the secondary systems Transend is proposing for replacement at Farrell substation, includes:

- the 110 kV and 220 kV bus bar protection schemes;
- Sheffield-Farrell 220 kV line protection schemes (2 circuits at both ends); and
- a number of 110 kV transmission line protection schemes.

The total expenditure for these elements is \$8.8m, a reduction of 20% from the \$11m in Transend's original proposal. The reduction is due to the deferral of other protection scheme replacements associated with another 110 kV line and two transformers.

The need for the remaining three elements of this project is discussed below.

110 and 220 kV Bus bar protection schemes

Transend's IES states that the existing bus bar protection schemes are of 25 year old static design, and are the only schemes of this type remaining on its network. Transend also states that they have recently suffered failures due to deteriorating components.

Transend has provided its revised economic analysis associated with these schemes. This analysis assesses the risks associated with failure of the protection schemes – similar to the reliability analysis discussed above on the substation redevelopments. This revised analysis does not support the proposed timing of these schemes in that a deferral of a number of years would result in a lower NPV.

This issue was discussed with Transend⁴². Transend considered that other risks associated with the possibility of a complete un-repairable failure were not allowed for in the analysis. Nuttall Consulting requested Transend to provide further information to assess the risks associated with this failure mode, covering Transend's view of the likelihood and consequence.

⁴² Discussed during on-site meetings.

Transend has provided revised information on these risks that indicates that the value of these risk will be exceptionally high i.e. a 50% probability that the bus zone protection will fail in 2009 requiring a 36 week outage, with an expected customer impact cost of \$5.4 million in 2009 on a project estimated at a capital cost of \$2.5 million⁴³.

Nuttall Consulting still has concerns with the validity of this revised information. Assuming the risk costs were not substantially less during 2008 and noting these risks are borne by the market then these figures suggest Transend may not have been applying good electricity practice in the management of this issue. However, we feel it is far more likely that the analysis is still incorrect, whereby the likelihood of the un-repairable failure has been significantly overstated by Transend.

On balance, noting the stated issues with the existing bus bar protection schemes and the role of Farrell in the Tasmanian system, we consider that it is highly likely that it will be prudent and efficient to replace these schemes at the stated time.

Sheffield-Farrell 220 kV line protection schemes

Transend has advised⁴⁴ that these schemes are of 26 years old static technology and this type has a history of failure. Furthermore, out of the existing 32 220 kV lines, these lines represent two of only three lines remaining with this static technology.

Transend has provided a revised economic analysis associated with these schemes. Similar to our concerns with the economic analysis supporting the busbar schemes, Nuttall Consulting considers the revised analysis does not support Transend's proposed timing of the need for these schemes. Furthermore, Nuttall Consulting considers a substantial increase in failure rates assumed in the economic analysis is not fully justified.

These matters were discussed with Transend and further details were requested. Transend has advised that due to their age, which exceeds Transend's standard life of 25 years, it expects increased failure rates and an increasing risk of un-repairable failure.

Noting the recent history of failures, it seems reasonable to expect some increase in failure rates may occur. However, Transend's assumed doubling each year appears excessive. On this point, it is worth noting that Transend's own age profile for relays indicates that it has a large proportion of static relays above its benchmark life of 25 years (33%), with the oldest 39 years.

With regard to spares to manage these relays, Transend has advised that at the present time it only has one complete spare for each relay type. It considers that this is sufficient in the short term, but risks will increase if this replacement is deferred until the next period.

On balance, noting the stated issues with the existing schemes and the role of these 220 kV lines in the Tasmanian system, we consider that it is likely that it will be prudent and efficient to replace these schemes at the proposed time – although the priority appears less than the busbars above.

110 kV transmission line protection schemes

Transend's revised proposal states that the need for the replacement of the 110 kV transmission line protection schemes relates to the augmentation of Rosebery substation⁴⁵.

⁴³ Transend email, dated 25/2/09

⁴⁴ Based upon the IES and further information contained in the email dated 25/2/09

Unfortunately, the appropriate timing of the Rosebery augmentation is not clear, and as such, the need for the timing of these replacements in the next period is not clear. The Transend proposal indicates the Roseberry augmentation is planned for 2014/15. However, during discussions, Transend stated that it is planning to advance the Rosebury augmentation as it presently does not comply with the ESI network performance regulations.

Nuttall Consulting has not assessed the Rosebery augmentation. However, we consider that the optimal timing is uncertain. As such, we consider that the likelihood that these elements will be required to be replaced in the next period is less than the busbar and 220 kV line protection schemes.

3.3.2.2. New Norfolk

The revised scope of the secondary systems that Transend is proposing to replace at the New Norfolk substation, includes:

- the 110 kV bus bar protection schemes; and
- the 110 kV transmission protection schemes associated with the transmission lines to the Creek Road, Meadowbank, Chapel Street and Tarraleah substations.

The total expenditure for these elements is \$5.8 million, a reduction of approximately 20% from the \$7.13 million in Transend's original proposal. The reduction is due to the deferral of other protection scheme replacements associated with other 110 kV lines.

The need for these remaining two elements of this project is discussed below.

110 kV bus bar protection schemes

Transend's IES states that bus bar protection schemes are 22 year-old and of static technology. It is the only one of its type on the transmission network and has limited spares.

Transend has provided a revised economic analysis associated with this scheme. However, similar to our concerns with the economic analysis for the Farrell protection schemes, Nuttall Consulting considers the revised analysis does not support Transend's proposed timing of the need for this scheme.

This issue was discussed with Transend, and a revised analysis of the failure risks was provided⁴⁵. This analysis assumes a failure of the scheme may occur from 2013 onward, based upon the scheme reaching its standard life in 2012. Transend assumed a loss of 100 MW for 56 hours for such a failure, with a probability of 2% for this failure.

Assuming a value of reliability of \$30,000MWhr, the value of the expected unserved energy is over \$3.5 million, which strongly supports the need for the replacement of the bus bar protection scheme by 2012.

Nuttall Consulting is still concerned with the robustness of Transend's revised analysis, which appears to predict an extreme increase in the expected unserved energy in 2013. This increase appears to be driven by the fact that the protection scheme reaches its standard life of 25 year in 2013, and therefore, its failure rate increases dramatically at this time.

⁴⁵ Page 23, Appendix 5, Transend revised proposal

⁴⁶ Transend email, dated 25/2/09

In Nuttall Consulting's opinion, such a significant step increase is unlikely to occur, and therefore, either there is an inefficient level of high risk in the preceding years⁴⁷ or the increase in 2013 is overestimated⁴⁸. We assume it must be the latter. However, it is worth noting that a much lower level of expected unserved energy (i.e. through a much lower failure rate) would still justify the replacement of this protection scheme. This reduced level of expected unserved energy may still be justified in 2013.

On balance, given the issues of limited spares and that the revised proposal appears to have this overall project incurring costs between 2012/13 – 2013/14, we consider that it is reasonable to consider that it will be prudent to replace these schemes at the proposed time.

110 kV transmission line protection schemes

These relays are of a similar age and technology (static) as the busbar protection scheme.

However, the main reason for the timing given in Transend's revised proposal and IES appears to be to coordinate with protection upgrades that will be occurring through the sub-redevelopment program at the connecting substations (Creek Road, Chapel Street, Meadowbank and Tarraleah).

In Nuttall Consulting opinion, the case for the 110 kV line protection is weaker than the busbar protection. As discussed above, Nuttall Consulting considers that there is still a reasonable possibility that some of the substation redevelopments may be prudently deferred by a few years. If this was the case then the protection renewal may also be deferred until after the next period. In this regard, it is worth noting that based upon Nuttall Consulting's assessment of Transend's risk review and economic analysis supporting the substation projects, Creek Road and Meadowbank appeared possible candidates for deferral of 1 or 2 years following more detailed evaluations. Tungatinah is already planned for commissioning outside the next period (2014/15).

As such, Nuttall Consulting considers that there is a reasonable possibility that some or all of these renewals could be deferred.

3.3.3. Conclusions and recommendations

In summary, Nuttall Consulting has concerns with the validity of Transend's revised economic analysis and the additional analysis provided during the course of our review. Nevertheless, on the balance of the information available, we still consider that the case is relatively strong for the replacement at Transend's proposed time of the bus bar schemes associated with Farrell and New Norfolk substations. Furthermore, the case for the 220 kV line protection schemes associated with Farrell is also relatively strong, although less so than the bus bar schemes.

We estimate these components to amount to \$4.5 million for the Farrell project and \$1.5 million for the New Norfolk project.

⁴⁷ This assumes that the failure rate close to the standard life is still significant, even if less than the 2% assumed at the standard life.

⁴⁸ This assumes that the failure rate of 2% for 2013 is an overestimate of the failure rate in 2013 – noting it was assumed by Transend to be zero in 2012.

Nuttall Consulting considers that the need for the remaining elements of these secondary projects is less certain. We estimate these uncertain components to amount to \$4.3 million of the Farrell project and \$4.3 million for the New Norfolk project.

In the context of this review, which is aimed at assessing an overall renewal capex allowance, it seems reasonable to assume a probability on whether the expenditure will be required as proposed. In the absence of better information, Nuttall Consulting considers a probability of 85% on the expenditure being required as planned during the next period is reasonable.

Nuttall Consulting considers that this reduction is consistent with the NER capital expenditure criteria and will provide sufficient capex to meet the NER capital expenditure objectives. Supporting this position, Transend has accepted that a 20% reduction has been found through further analysis of these two projects as a result of the original Nuttall Consulting renewal recommendation. Transend has not proposed a reduction on any other secondary renewal replacements in its capital plan.

Due to the limited timeframe of this review, there has not been sufficient time to attempt to appreciate the significance of Transend's accepted reductions across the other projects involving secondary renewals – not least in terms of appreciating the scale of secondary renewals across the overall capital expenditure program. As such, Nuttall Consulting has not considered other adjustments across other secondary renewal needs. Should the AER decide to alter this recommendation on these two projects, it may be important to reconsider whether the findings applicable to these two programs are equally applicable across the overall secondary renewals program.

3.4. Burnie-Waratah 110 kV wood pole replacements

3.4.1. Background and appreciation

Transend's original proposal allowed for 30 structures (60 poles) to be replaced in 2011/12 and 40 structures (80 poles) to be replaced in 2013/14.

Nuttall Consulting did not consider that this scale of replacement reflected the recent level of replacements and recommended a 50% reduction to Transend's proposed expenditure in 2011/12. Further, Nuttall Consulting considered that Transend's recent pattern of expenditure occurring in the year following the inspections would result in no expenditure being required in 2013/14, even if some poles were condemned in 2013/14 through its inspection process.

Transend's revised proposal has not accepted the Nuttall Consulting recommendations, and proposes the complete reinstatement of its original proposed expenditure.

Transend's position is based upon two main factors:

- Firstly, Transend considers that its forecast replacement rate is based upon Aurora's wood pole replacement statistics. Transend states that its rate "*has been determined by Aurora over a 40 year period for an asset base including 250,000 wood poles*"⁴⁹.

⁴⁹ Page 26, Appendix 5, Transend's revised proposal

It considers that this statistical model is consistent with historical condemnation rates. Transend also considers that its longer-term trend in replacement rates is consistent with its forecast replacement rate.

- Secondly, Transend considers that replacement would normally occur in the same year as the inspections. Transend advised in its revised proposal that it had changed its inspection policy in 2006 to ensure inspections occurred in the summer, with the replacement of any condemned poles within 3 months of the inspection. Related to this matter, Transend advised of an error in the cost template, in that the year for the 1st set of replacements should be 2010/11, and not 2011/12. This resulted in the forecast expenditures being brought forward by one year.

3.4.2. Nuttall Consulting review

Nuttall Consulting has reviewed the information provided by Transend to support its revised proposal⁵⁰.

With regard to the issue related to the timing of replacement to inspections, Nuttall Consulting sees no reason to dispute Transend's clarification on this matter. As such, Nuttall Consulting accepts that some allowance will be required in 2013/14 for pole replacement that may occur in that year.

With regard to the number of replacements, Nuttall Consulting does not accept Transend's position that the Aurora model should be used as the sole predictor of future replacement needs. Particularly when considering short-term replacements for a limited population of poles such as the Burnie-Waratah line.

Nuttall Consulting accepts that the Aurora model has some statistical significance across a large population of wood poles in Tasmania, but this significance or, more importantly, the accuracy of its predictions, should reduce for isolated populations such as a single line. For example, the Aurora model is based on a population of 250,000 wooden poles of various wood types, construction types, soil conditions and local environments. The Burnie-Waratah line represents a much smaller number of poles that are significantly more homogenous in terms of location, wood type, soil conditions and local environment.

On this basis, it is consistent with good engineering practice to consider actual records and test results taken from the line, rather than to rely solely on an aggregate model.

Good engineering practice for the management of wood poles would also predict future failures of the poles based on the amount of sound wood found to exist at the time of inspection. The trending and comparison of the remaining sound wood data would provide a very strong indicator of the likely future replacement requirements. Transend has advised that it does not receive this information from its pole inspection provider (Aurora Energy).

The following information highlights the high degree of variability between the aggregate Aurora model and actual replacement requirements. In the mid 90s Transend was replacing poles on this line at a rate of around 17 per year. This is over three times the rate predicted by the model - about 5 per year. It is difficult to accept that in these circumstances,

⁵⁰ Transend emails, dated 5/2/09, 24/2/09, and 27/2/09

Transend would have considered that 5 pole replacements per year was a reasonable forecast for replacement needs.

Based upon the above, Nuttall Consulting considers that the recent history of condemnation rates should play a significant role in predicting the condemnation rates over the short term. However, Nuttall Consulting accepts that the Aurora model should be given some significance in the prediction.

Given that the variance in the statistical model is not known, if an equal weighting is applied to the model prediction of 10 poles per year and the recent average historical rate since 2000 of 3 poles per year then the predicted condemnation rate would be 6.5 per year. This represents a small increase from that allowed for in Nuttall Consulting's original recommendation of 5 per year. As such, Nuttall Consulting considers that a reasonable prediction of the condemnations in the next inspection cycle (2010/11) is 20 poles, resulting in the replacement of 20 structures. This represents a reduction in 2010/11 expenditure for this project of 1/3 of that proposed by Transend.

Furthermore, given that the condemnation of one pole normally will require the replacement of two poles with one steel pole, the Nuttall Consulting recommendation allows for the replacement of 40 wood poles. It seems reasonable to expect that either some of these poles will offset some condemnations that would have resulted in the next inspection cycle 2013/14⁵¹. Therefore, given the model condemnation rates remains at 10 pole per year, Nuttall Consulting does not see a good reason to allow for any more than 20 steel pole replacements in 2013/14. This represents a reduction in the 2013/14 expenditure for this project of 1/2 of that proposed by Transend.

In appreciating this recommendation, it is worth noting that in Transend's revised proposal it is suggested that Nuttall Consulting's recommendation represents a change in policy, in that this reduction will result in an increased likelihood of failures if poles are not replaced. It is important to stress that Nuttall Consulting is not proposing any change in policy; the recommendation is only a prediction for regulatory purposes of the most likely number of poles that may be condemned following inspections. In reality, Transend must replace the poles that are condemned following the actual inspections in line with its stated practices and procedures. This actual number may be lower or higher than that prediction presented here, or Transend's own forecast. As such, Nuttall Consulting considers that its estimate is a reasonable estimate that attempts to balance the *financial* risks on Transend and its customers.

3.5. Summary of renewal recommendations

Nuttall Consulting has reviewed the three renewal elements that Transend's revised proposal contests with regard to the AER's draft decision, namely the reductions related to:

- the 110 kV substation redevelopments;

⁵¹ Pole failure as a result of internal rot is directly related to the type of wood, soil conditions, and the local environment. As pole pairs share each of these attributes, it is reasonable to assume that where one pole in a pair is found to require replacement that the other pole in the pair will be in a similar condition. On this basis, replacement of the second pole could be considered as simply advancing the second replacement by a short period.

- secondary systems replacements; and
- Burnie-Waratah wood pole replacements.

Based upon Nuttall Consulting's review of the information Transend has provided to support its position on these items, Nuttall Consulting accepts that this information justifies an increase from the amount recommended in our renewal report to the AER, which we understand was the basis of the AER's draft decision.

However, Nuttall Consulting still considers that Transend has not adequately demonstrated that the expenditure in its revised proposal reasonably represents the prudent and efficient amount required to achieve the NER capex objectives. Therefore, Nuttall Consulting has recommended a number of reductions to Transend's renewal expenditure. In Nuttall Consulting's opinion, these reductions will most likely represent the prudent and efficient expenditure considering our view of the following:

- the further optimisation of plans that should occur on the substation redevelopments and secondary system replacements as Transend applies its governance procedure and practices; and
- the most likely number of pole replacements, given the recent condemnation rates for the Burnie-Waratah line.

These recommendations are summarised in Table 2 below. These reductions represent a 10% reduction overall in Transend's revised proposal on renewal expenditure.

Table 2 Nuttall Consulting's recommended adjustments to Transend's renewal expenditure

	<i>\$ million (2008/09)</i>					
	2009-10	2010-11	2011-12	2012-13	2013-14	total
Transend's revised proposal	29.5	41	23.6	61.9	66.7	222.7
110 kV substation redevelopment		-0.3	-1.1	-8.6	-8.2	18.3
Secondary system	-0.3	-1.0	-0.0	-0.2	-0.7	2.2
Wood Pole		-0.8			-1.7	2.5
Recommendation	29.2	38.8	22.5	53.1	56.2	199.8

Nuttall Consulting considers that it is important that these recommendations are considered in the context of Transend's overall renewal needs, and the more rigorous evaluation that would occur across these plans – particularly noting Transend's stated governance procedures. That is, Nuttall Consulting has only recommended cuts based upon the projects reviewed; however, the scale of these cuts has to be appreciated across the whole of the renewal program (i.e. a 10% reduction); where, based upon the finding of this review, it is reasonable to assume other efficiencies may be achievable following further analysis.

Furthermore, as will be discussed later on the two augmentation projects reviewed, there also appears to be some scope that discretion may exist in some of the compliance projects. As such, Transend's ability to manage the risks due to the renewal program has to be seen in the broader context of the overall capital and operating expenditure allowance, particularly the ability of Transend to manage its overall risks within that allowance. This point appears

particularly relevant noting that no other significant cuts have occurred, other than in renewal expenditure, from that proposed by Transend in its original proposal.

4. Waddamana – Lindisfarne 220 kV 2nd circuit

4.1. Background and appreciation

Regulatory treatment

Transend's original proposal treated the Waddamana-Lindisfarne 220 kV 2nd circuit project (W-L 2nd circuit) as a contingent project. The forecast expenditure related to constructing this line and stringing the 1st circuit was proposed for the ex ante capital allowance.

WorleyParsons reviewed both projects during its review of Transend's original proposal.

Transend's position on both projects was accepted by the AER in its draft decisions.

The contingent trigger for W-L 2nd circuit is defined in the AER's draft decisions as:

- either,
 - the demand forecast in Tasmania's southern area exceeding 880MW, or
 - Gordon Power Station not being able to provide reactive support when the southern area load exceeds 775MW;
- resulting in the successful application of the regulatory test for augmentation of the transmission capacity into Southern Tasmania.

In Transend's revised proposal, Transend has requested that capital expenditure associated with the W-L 2nd circuit project is allowed for in the ex ante capital expenditure as it considers that the trigger events have occurred⁵², namely:

- Hydro Tasmania has advised that Gordon Power Station will not be available for an extended period during 2014; and
- the Southern area's demand is forecast to exceed 775 MW from 2009 onwards.

Transend has also undertaken the regulatory test and conducted the NER consultation process associated with this project⁵³.

The general scope of the W-L 2nd circuit in Transend's revised proposal has not changed from the original proposal, involving:

- the stringing of the 2nd circuit of the proposed Waddamana-Lindisfarne 220 kV line;
- the installation of an additional 220/110 kV autotransformer at Lindisfarne; and
- additional substation bays and associated substation work at Waddamana and Lindisfarne to allow for the connection of these items.

⁵² Transend's revised proposal, Section 3.3.4

⁵³ Refer to Public Consultation Paper available on Transend's website

The capital expenditure forecast for this project has reduced from \$25.2 million in Transend's original proposal to \$18.5 million in its revised proposal. Nuttall Consulting understands that this reduction is largely due to the fact that Transend is now proposing to undertake the stringing of the 2nd circuit (and associated works) within the broader Waddamana-Lindisfarne 220 kV line construction project. Therefore, the timing of the proposed project must coincide with the Waddamana-Lindisfarne 1st circuit project to (i.e. 2010) to ensure the overall project cost efficiencies can be realised.

Overview of the need and regulatory test

The following is based upon the Capital Project Investment Report (W-L CPIR) for this project, provided by Transend⁵⁴, and other discussion with Transend staff during our on-site meetings.

The main need for the W-L 2nd circuit (or alternative) concerns a network voltage limitation that impacts the ability to supply the Southern area demand. Whether or not this limitation may constrain the supply into this region is highly dependent on the demand level of the southern Tasmanian power system and the availability of generation in the southern region, particularly Gordon Power Station. As the level of available generation decreases, so does the supportable demand due to this limitation.

The Waddamana-Lindisfarne 1st circuit will increase this limit along with other planned augmentations. However, Transend still considers that the limit (assuming Gordon Power Station is unavailable) will be exceeded after 2009, based upon the latest forecast of the Southern area maximum demand⁵⁵.

Transend's documentation⁵⁶ indicates that the existing supportable Southern area demand due to this limitation is 595 MW, assuming Gordon Power Station is unavailable. This increases to 775 MW following the W-L 1st circuit (plus other reactive works) and 835 MW following the 2nd circuit⁵⁷. The full output of a single largest unit (1 of the 3 x 130 MW units) increases this limit by over 100 MW.

The latest maximum demand forecast (developed in 2008) predicts the winter maximum demand in 2010 to be 804 MW, with this increasing by 2014 (the proposed time of the power station outage) to 848 MW. Therefore, the winter maximum demand is forecast to exceed the limitation by 73 MW in the year that Transend considers Hydro Tasmania will undertake a planned outage of the Gordon Power Station.

Transend has assessed this project under the market benefits limb of the regulatory test. Based upon Transend's market modelling, the planned outage of Gordon Power Station in 2014 will result in 3,720 MWhr of expected unserved energy, assuming only the W-L 1st circuit is commissioned⁵⁸. The value of this unserved energy is approximately \$110 million assuming a value of \$30,000 \$/MWhr.

Transend has considered three options in its regulatory test analysis:

⁵⁴ W-L CPIR provided in Transend email, dated 21/1/09

⁵⁵ Pg 3, W-L CPIR

⁵⁶ Table 16, Southern Regional Plan, TNM-GP-809-0824

⁵⁷ It is worth noting that Transend has advised that the limits are different in the detailed market modelling (Transend email, dated 25/2/09). However, we do not consider that this difference impacts our discussions and findings.

⁵⁸ Table 2, W-L CPIR

- a *do nothing option*,
- a *combined option*, involving the stringing the 2nd circuit with the 1st circuit in 2010 (this project), and
- a *deferral option*, involving the stringing of the 2nd circuit in 2016 (similar to the original continent project option).

It is important to note that only the combined option actually addresses the unsupported demand during the Gordon Power Station outage. As would be expected, given this fact and the very large value associated with unserved energy due to the outage, the combined option maximises the net benefits, with a net benefit of \$60 million compared against a net cost of \$1 million for the deferral option⁵⁹.

Transend has also undertaken sensitivity studies on the value of customer reliability (VCR), the capital cost and the load forecast. The sensitivity analysis on the VCR and capital cost indicated the combined option maximised the benefit by a considerable margin over the deferral option⁶⁰ – as also would be expected given the point made above.

On the other hand, the sensitivity studies on the load forecast⁶¹ indicate that the combined option maximises the net benefits for the medium and high economic growth forecast. However, the do nothing option maximises the net benefits for the low load growth option. Similar, results were obtained for the “preliminary load forecast for 2009”.

Transend considers that the combined option is the preferred option as it addressed the identified issues and provides the highest net market benefits of the options considered⁶².

4.2. Nuttall Consulting review

Nuttall Consulting has reviewed the information provided by Transend in support of this project.

Due to its significance, Nuttall Consulting has also undertaken a high-level review of the information provided to support the Waddamana-Lindisfarne 1st circuit project. It is important to note that the purpose of the review of the W-L 1st circuit documentation was to determine useful information that is relevant to the W-L 2nd circuit. This high-level review did not attempt to determine the appropriateness or otherwise of the W-L 1st circuit.

The main information that has informed this review includes:

- Transend's Capital Project Investment Review associated with this project, which summarises the justification for this project;
- Transend's public consultation paper associated with this project; and
- Transend's Southern Region Development Plan, which details Transend's plans for the development of the Southern area transmission network.

⁵⁹ Table 3, W-L CPIR

⁶⁰ Table 5, W-L CPIR

⁶¹ Table 6, W-L CPIR

⁶² Pg 9, Section 8, Public Consultation Paper

On-site discussions with Transend staff have been held, and further clarifications and information requests on a number of matters have been requested of and provided by Transend. The most relevant of these matters are discussed below.

Nuttall Consulting's overall finding from this review is that Transend has not adequately demonstrated that it has undertaken the regulatory test correctly. Based upon the best available information at this time, there appears a reasonable possibility that the Gordon Power Station outage may occur at a time such that other reasonable alternatives – not considered by Transend in its analysis – may be found to maximise the market benefits.

Nuttall Consulting considers that the AER should continue to treat the W-L 2nd circuit as a contingent project until Transend has adequately demonstrated that:

- the planned outage of Gordon Power Station will most likely extend across the peak winter period; or
- the risks associated with the uncertainty in the outage timing are sufficient to justify the W-L 2nd circuit project under the regulatory test, considering all reasonable alternatives.

It is important to note that Transend's assessment of this project involves a large level of technical and market analysis to undertake the regulatory test. Nuttall Consulting has not undertaken a detailed review of these models and the underlying methodology and analysis. That said, given that this project has been under review since the inception of the W-L 220 kV line project, including the WorleyParsons review on behalf of the AER, Nuttall Consulting does not consider that this limitation should affect our findings.

In the sections that follow, we discuss the three main factors that relate to our recommendation above, namely:

- **the need**, covering the sensitivity of the timing of the planned Gordon Power Station on the expected unserved energy;
- **reasonable alternatives** to address the unserved energy and significance to the regulatory test findings; and
- **the 2009 preliminary load forecast.**

4.2.1. The need

Nuttall Consulting understand that the planned outage of Gordon Power Station (GPS) is required to perform major maintenance on both the intake gate and all three generation units.

As noted in the background section above, the planned outage of GPS results in the vast majority of the expected unserved energy (EUE) that is driving the need for some additional network capability – essentially to cover this outage in the short term⁶³.

⁶³ It is noted that forced outages of the power station and the forced double circuit trip of the line from GPS to Chapel Street may also result in similar voltage collapse conditions. However, Transend's analysis indicates that the value of the expected unserved energy due to these events is significantly lower than the planned outage.

It is clear however that the timing and duration of the planned outage could significantly change the EUE. Importantly, the timing within the year can significantly affect the EUE; given that the Southern area is winter peaking, an outage that does not cover the winter period (or only part of) will result in less load exceeding the limitation. Transend's W-L CPIR indicated that Transend was assuming a 6-month outage in 2014 that covered the full winter peak period.

It is also important to note that if the planned GPS outage was delayed until 2015 or after then the stringing of the 2nd circuit just prior to that date may maximise the benefits.

Due to the significance of the assumptions on the timing of the GPS outage, the AER requested evidence from Transend supporting the timing of the planned outage.

Transend has provided copies of emails from Hydro Tasmania that discuss the timing. The important points from these emails are:

- The latest emails, dated 2 February 2009, from Hydro Tasmania indicate that the outage is presently planned (Text has been removed due to its commercial-in-confidence nature). This was also advised in an email in 10 December 2008, in response to a specific request from Transend on this matter.
- Advice on 15 December 2008, indicated (Text has been removed due to its commercial-in-confidence nature).
- The 10 December 2008 email also noted that (Text has been removed due to its commercial-in-confidence nature).
- An email, dated 29 May 2008, advised that (Text has been removed due to its commercial-in-confidence nature).

The above indicates that the outage, as presently scheduled, will occur over a period that is not as onerous as that assumed by Transend in its analysis. These dates appear to be the best available information at this time, and it is not clear why this was not more explicitly addressed in the information originally provided to the AER concerning this project.

Nuttall Consulting certainly accepts that this information is only provisional at this stage, and as such, the timing may change and the outage could be extended. However, it is important to note that there are strong commercial reasons for Hydro Tasmania to minimise the outage duration. Furthermore, the 10 December 2008 email noted above, states that the actual time may well be a trade off between generation (which would want an outage during the drying summer months) and trading (which we assume would want an outage during the winter when market prices are lower). However, the compromise position appears to be the January to May or the August to December shoulder periods. Although we do not know the details of the maintenance to be undertaken on the intake gate, in the absence of information to the contrary, we consider it reasonable to assume Hydro Tasmania would not undertake this maintenance during the peak of the winter months, and so, risk delays and cost overruns due to inclement weather.

Due to the possible significance of this issue on the level of EUE and as such market benefits, Nuttall Consulting requested that Transend provide the EUE estimates assuming

the GPS outage is in the January to May period and the August to December period. Table 3 summarises Transend's response to this query.

Table 3 EUE for various Gordon Power Station outage durations

Outage period	EUE (MWhr)
Winter 2014 – 6 month	3720
Jan – May 2014 (20 weeks)	650
Aug – Dec 2013 ⁶⁴	900 ⁶⁵

These results indicate that the movement of the GPS outage to the shoulder period, with the planned outage duration, significantly reduces the level of EUE. These reduced EUE amounts still result in significant costs e.g. 650 MWhrs equates to \$19.5 million assuming a VCR of \$30,000. However, the more important point for our discussions in the next section on alternatives is that these results suggest that the maximum level of demand above the limitation during these periods is around 50% of the excess amount for the peak winter 2014 maximum demand.

This also suggests that if the GPS outage occurred prior to 2013 for the presently proposed period, no additional network capability (or at least very little) may be required. Given the point above that if the outage is taken after around 2015 then the stringing of the 2nd circuit just prior to the outage may well maximise the market benefits, it appears that the present assumed timing of the GPS outage is the most onerous from the transmission network's perspective.

It is important to note that the uncertainty in the timing of the GPS outage and duration does impose risks on Transend and its customers in terms of the option it undertakes in addressing the unserved energy. For example, if Transend it is to undertake the 1st circuit concurrently with the 2nd, it needs to make this decision soon. Nuttall Consulting also accepts that certain matters concerning Hydro Tasmania's planned outage may be commercially sensitive. Nevertheless, within the regulatory test analysis, we would expect the affect of the timing of the GPS outage to be more explicitly addressed - possibly through sensitivity analysis - in order that the significance of these matters to the evaluation of all reasonable options is far more transparent.

One final point concerning the need relates to the possibility of non-compliance with the minimum network performance obligations on Transend set out in the Electricity Supply Industry (Network performance requirements) Regulations 2007 (ESI regulations). Such a non-compliance issue may require the project to be assessed via the reliability limb of the regulatory test. Transend's W-L CPIR and the public consultation paper did not raise these matters to be a factor associated with the need for the project. However, in responding to

⁶⁴ It is worth noting that Nuttall Consulting requested the 2013 period. However, the outage period may be the equivalent 2014 period. If this was the case then we would expect this to increase in the order of 5 to 10%.

⁶⁵ The 900 MWhr value is based upon the estimate provided by Transend of 810 MWhr. This has been increased by 11% by Nuttall Consulting to account for the relative increase in Transend's estimates to the market modelling results, which are the basis for the other values provided in this table.

some queries of Nuttall Consulting concerning possible alternatives (see Section 4.2.2.2 – special protection scheme), Transend did raise the issue that the system could be non-compliant with the ESI regulations during the outage of GPS. Specifically, Transend considered the network would breach clause 5(1)(a)(i) of these regulations, which requires no more than 25 MW of load to be capable of being interrupted by a credible contingency.

Unfortunately, the ESI regulations are silent on how the unavailability of GPS should be treated in determining non-compliance. Nuttall Consulting considers that there is a reasonable case that this specific clause does not allow for the planned or forced outage of the whole power station (including the double circuit outage of the line from this power station)⁶⁶. Furthermore, it is not clear from the information provided to Nuttall Consulting whether any other minimum performance requirements in the ESI regulations would be breached.

Based upon the above, Nuttall Consulting does not consider that Transend has satisfactorily demonstrated that non-compliance with its ESI regulations is an additional matter driving the need for this project at this time. It is also worth noting that the ESI regulations require augmentations with a cost above \$15 million to be approved by the Minister. Moreover, 6(5)(a) of the ESI regulations indicates that the Minister must assess the costs and benefits associated with the project. As such, it appears that such an approval may well revert to a test similar in nature to the market benefits limb of the regulatory test as presently applied, and therefore, it is not clear if this non-compliance issue would change the preferred alternative or the optimal timing.

All that said, in a review of this form, it is impossible for Nuttall Consulting to confirm whether non-compliance will exist in the absence of Transend's analysis. Therefore, should planning information be made available by Transend that demonstrates that non-compliance will occur then the AER may need to reconsider this matter.

4.2.2. Alternatives and justification

An important issue here is whether Transend has considered all reasonable alternatives. Due to the sensitivity of the GPS outage timing on matters, and the fact that Transend has only considered one alternative that actually addresses the unserved energy due to the GPS outage, this is particularly relevant.

The main alternatives considered here are:

- reactive plant;
- the use of a special protection scheme; and
- network support.

⁶⁶ Clause 4.2.3 of the NER states that a credible contingent event would be the outage of a single generating unit or a single circuit of a double circuit line. This view is also supported by definitions in 5(4) of the ESI regulations.

4.2.2.1. Reactive plant

As noted in the introduction, the potential network limitation concerns voltage issues. Generally, the installation of static reactive plant (e.g. capacitor banks) is the most efficient solution to these matters. Furthermore, Transend's long-term network development plans indicate that Transend is planning on installing significant amounts of additional reactive plant in the period just following the next⁶⁷.

As such, it was not clear from the information provided to Nuttall Consulting why additional capacitor banks – possibly through the advancement of planned installations – were not considered a reasonable alternative. This matter was discussed with Transend⁶⁸ and Transend advised that they considered dynamic reactive plant (e.g. an SVC) would be required, which would be more expensive than the line option.

Due to the significance of the sensitivity of the timing of the GPS outage on the level of network capability required, Nuttall Consulting requested that Transend provide further clarifications on the expected impact of capacitor banks on the voltage limitation⁶⁹.

Transend's response to this matter indicates that an additional 80 MVAR of capacitor banks is possible before dynamic reactive plant is required⁷⁰. The impact of this additional amount on the limitation is not provided in Transend's response. However, Nuttall Consulting estimates that these additional capacitor banks would increase the limitation by approximately 40 MW⁷¹. Importantly, this increase should be sufficient to significantly reduce the EUE during the GPS outage if it occurs as presently planned by Hydro Tasmania.

It is difficult from the information available to this review to determine the significance of the above, including the relationship to Transend's existing reactive plans. However, Nuttall Consulting considers that the use of capacitor banks appears to be a reasonable option for a more thorough evaluation within the regulatory test.

4.2.2.2. The use of a Special Protection Scheme

Transend's documentation indicates that it has an existing special protection scheme (SPS) to initiate involuntary load shedding following certain contingencies at times when the GPS is not available⁷². Nuttall Consulting understands that this SPS relates to the voltage limitation discussed here, and allows post-contingent shedding under these circumstances - rather than pre-contingent shedding which would be required without it. As such, this SPS significantly reduces the possibility that shedding will be required.

This SPS, or a modified version of it, is not considered in Transend's analysis⁷³.

⁶⁷ Annual Planning Review presentation, provided in Transend email dated 2/7/08

⁶⁸ Discussed during on-site meeting

⁶⁹ Nuttall Consulting email, dated 23/2/09

⁷⁰ Transend email, dated 25/2/09

⁷¹ This assumes a ratio of 1 MW to 2 MVAR, which was advised during the meeting the on-site meetings, and accords with information contained in Transend's Southern Regional Plan document.

⁷² Transend's Southern Regional Plan, Section 1.7.4

⁷³ Stated in Appendix A of the McLennan Magasanik Associates report, "Assessment of market benefits from grid reinforcement in Southern Tasmania", available on Transend website, and confirmed in discussions with Transend.

Due to the potential impact an SPS, such as this, could have on the level of EUE, Nuttall Consulting requested further clarifications on why it was not considered. In response to this, Transend has advised:

“Modelling the SSSPS was not included because when the southern Tasmanian load is greater than the various voltage stability triggers (depending on transmission network configuration) then more than 25 MW of load would be interrupted by a credible contingency event, thus the planned network is in violation of section 5(1)(a)(i) of the network performance requirements.

A modified SSSPS - even if it was a technically viable solution (studies would need to confirm this) – is not a permitted solution because section 5(2)(a) of the network performance requirements does not allow load shedding to control network loads after a credible contingency event when meeting the minimum performance standards.”

As discussed in Section 4.2.1, Nuttall Consulting does not consider that it is clear that this specific minimum network performance obligation is relevant to this situation. Nevertheless, even allowing for this compliance obligation, given the sensitivity of the GPS outage timing on the maximum demand level that may need to be shed, plus the possibility of advancing capacitor bank installations to reduce this level further, Nuttall Consulting considers that an SPS could still be part of a reasonable alternative. This may involve a combination alternative (e.g. advancing capacitor banks plus a SPS).

It is also important to note that such an SPS may significantly limit the risks associated unanticipated changes in the outage timing or duration. As such, it would be important to consider this possibility in any sensitivity analysis associated with the GPS timing.

4.2.2.3. Network support

Transend has advised⁷⁴ that:

- it has completed its consultation process and no submissions were received; and
- it does not have any generation connection enquiries that could reasonably be considered to be able to support the demand by 2014.

Given the Transend consultation document indicates a very large level of unserved energy will result during the GPS outage, and the fact that this is required under normal circumstances, we do not find this surprising.

However, considering the points we have made above concerning the reduced level of maximum demand if the GPS outage occurs as presently planned, and the ability to reduce this further by the installation of capacitor banks then it appears that the possibility to negotiate a suitable network support option – possibly in combination with other works - may have been far more likely.

A very important point to note on this issue is that an SPS involving the network support would significantly reduce the likelihood that the proponent may need to actually shed load i.e. shedding would change from pre-contingent to post contingent. This SPS/network

⁷⁴ Advised during on-site meeting with Transend staff.

support option would also comply with the ESI network performance regulations as it involves shedding via an agreed contract.

Nuttall Consulting considers that if all these matters were more explicitly set out in Transend's consultation document then it is far more likely that a suitable network support proponent may have eventuated.

4.2.3. The 2009 loads forecast

Due to the significance of the present economic outlook, the AER has requested that Nuttall Consulting assesses the need for the W-L 2nd circuit in light of Transend's latest load forecasts.

Transend's W-L CPIR indicates that its preliminary 2009 forecast does not change the findings of its regulatory test. The AER requested that Transend provides its preliminary forecast to help substantiate this.

Transend has provided its preliminary 2009 forecast for the Southern areas – see Figure 7. This indicates very little change between the 2008 forecast and the preliminary 2009 forecast. Importantly, the 2014 maximum demand is only 4 MW or 0.5% less than the 2008 forecast. Transend considers that this is mainly because the present predicted reduction in the Tasmanian state load forecast⁷⁵ is not expected to affect the Southern area demand as significantly as other areas of Tasmania⁷⁶.

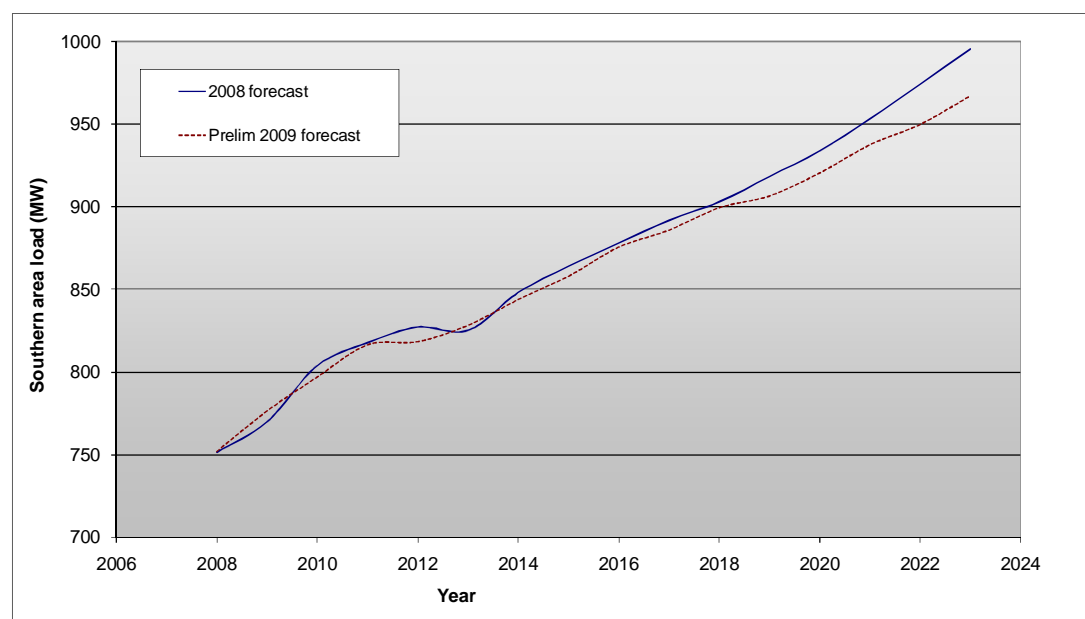


Figure 7 Transend's Southern area load forecast

Nuttall Consulting has not been requested to conduct a review of the demand forecasting methodology. Based on the revised forecast, Nuttall Consulting agrees that these should not significantly affect the regulatory test findings.

⁷⁵ Aurora letter in Appendix 11 of Transend's revised proposal provides a state-wide reduction from 2.4% to 1.8%.

⁷⁶ Advised during on-site meetings

Nevertheless, it is important to note that Transend has advised that this forecast is only preliminary. Given also that Transend's own analysis suggested that a maximum demand forecast based upon a low economic growth would result in the W-L 2nd project not meeting the regulatory test, it may be prudent for the AER to reconsider this matter in light of any updates to the load forecast that may occur prior to its final decision.

4.3. Summary and recommendations

Nuttall Consulting has reviewed the documentation provided by Transend to support the W-L 2nd circuit. Nuttall Consulting has also held discussions with Transend on this project and requested further information from Transend on a number of matters.

Based upon our review, we consider that the combination of Hydro Tasmania's proposed year for the planned outage of GPS in 2014 and Transend's assumptions of the duration within that year are effectively worst-case conditions.

Should the outage eventuate over a less critical period, then we consider that other reasonable alternatives, not explicitly considered by Transend, may satisfy the regulatory test. These include:

- assuming the GPS outage is advanced and/or the duration is less onerous,
 - advancement of planned capacitor bank installations, a special protection scheme, and network support – or most likely an option involving a combination of these; and
- assuming the GPS outage is deferred to the winter of 2015 or beyond,
 - the W-L 2nd circuit project just prior to the outage.

Nuttall Consulting considers that these matters have not been appropriately considered in Transend's documents, including its public consultation document. As such, we have concerns that the regulatory test and associated consultation has not been undertaken appropriately.

That said, should the GPS outage occur in 2014 for the period assumed by Transend then we consider it reasonably likely that Transend's preferred solution will still satisfy the regulatory test.

Therefore, Nuttall Consulting recommends that the AER should continue to treat the W-L 2nd circuit as a contingent project until Transend has adequately demonstrated that either:

- the planned outage of Gordon Power Stations will most likely extend across the peak winter period in 2014; or
- the risks associated with the uncertainty in the outage timing are sufficient to justify the W-L 2nd circuit under the regulatory test, considering all reasonable alternatives, including:
 - reactive plant with full cognisance of Transend reactive plans independent of this need;
 - the optimal timing the 2nd circuit if undertaken after the 1st circuit;

- a ESI network performance regulations compliant special protection scheme using involuntary load shedding, similar to the existing “southern system special protection scheme” (SSSPS) to mitigate risks due to timing variations;
- network support utilising a post-contingent special protection scheme, if feasible, to mitigate risks due to timing variations (i.e. based upon the SSSPS); and
- combinations of the above.

It is also important to note that Transend's preliminary 2009 forecast does not affect the findings of the regulatory test as it does not show a significant reduction in maximum demand up to the GPS outage period. Should this position change significantly prior to the AER's final decision then this matter may need to be reassessed if the AER has made an ex ante allowance for this project.

It is also worth noting that, during the course of our review, Transend raised the issue that non-compliance with the minimum performance requirements in the ESI regulations is a further factor driving the need for the project. However, Nuttall Consulting does not consider that Transend has satisfactorily demonstrated that this is the case. Moreover, even if this is the case, it is unlikely that this will change our view concerning Transend's lack of consideration of reasonable alternatives. Nevertheless, should further information become known that supports Transend's position on this matter then the AER may need to reconsider our recommendations provided above.

5. Sheffield Burnie 110 kV line augmentation

5.1. Background and appreciation

Regulatory treatment

Transend's original proposal included a provision of \$14 million in its ex ante capital expenditure forecast to allow for the augmentation of the Sheffield-Burnie 110 kV transmission line in 2012/13. The augmentation involved the up-rating of the existing 110 kV double circuit line.

This project was not specifically reviewed; however, Nuttall Consulting understands that the AER's draft decision allowed for this project, in principle.

Due to the present economic circumstances, the AER has requested that Nuttall Consulting undertakes a review of this project to determine how the prudent and efficient expenditure for this project may be affected by these changing circumstances.

The need and justification

The following information is based upon Transend's Capital Project Investment Review provided to support this project (S-B CPIR)⁷⁷.

Under normal operating conditions, the Burnie region is supplied from Sheffield by a double circuit 110 kV line and a single circuit 220 kV line. Transend documentation indicates that the main need for the augmentation (or alternative) concerns the potential thermal overload of the 110 kV line following the outage of the 220 kV line.

The most impending overload conditions for these 110 kV circuits concerns the summer peak demand time when each 110 kV circuit has a design rating of 55 MVA (due to a design operating temperature of 49°). This equates to a Burnie supply limit of approximately 110 MVA, based upon the design rating.

Should a potential overload condition occur, in order to maintain a secure system⁷⁸, Transend can radialise the network – thus placing the Burnie region's demand on a series of radial feeds. This removes the possibility of the overload following the contingency i.e. the system is secure. However, it exposes these radial fed loads to the possibility of involuntary load shedding should an outage of any of the radial feeds occur. Radialising the network can place around 40 MW at risk of shedding due to a contingency.

Mitigating the need to radialise the network are two factors. The first is the use of dynamic ratings on the 110 kV lines. This can provide additional capability above the design rating, due to ambient conditions. The second concerns the Woolnorth wind farm, which is located

⁷⁷ S-B CPIR provided in Transend email, dated 21/1/09, and then revised version provided in email, dated 25/2/09

⁷⁸ This is an obligation on Transend via the NER, and requires that the system must remain in a "satisfactory" state following a credible contingency i.e. following an outage of the 220 kV circuit, the remaining 110 kV circuits must not be overloaded.

within the Burnie region. When this wind farm is generating, its output offsets the supply needed from Sheffield; thus, reducing the loading on the 110 kV line.

The S-B CPIR states that the supply limit was exceeded in the summer of 2007 by 28% and the summer of 2008⁷⁹, but the use of dynamic rating and the wind farm output resulted in no need for radialising the network.

The S-B CPIR also states that during January 2009, there were 19 periods when the load would have exceeded the dynamic ratings. Moreover, owing to the high ambient temperature, Transend considers that the reduced rating meant that radialising would not have been effective in ensuring a secure state i.e. pre-contingent shedding would have been required. Fortunately, these events did not last long enough, and so shedding did not occur.

Transend considers that the need for this project concerns compliance with both the NER and Tasmanian Electricity Supply Industry (Network Performance Regulations) 2007 (ESI regulations) as follows:

- 4.3.1 of the NER, which requires NEMMCO (or its agents) to maintain power system security;
- S5.1.2.1 and S5.1.2.2 (a) of the NER, which relate to the obligation for sufficient capability to supply customer load under normal circumstances e.g. the January 2009 conditions; and
- 5(1)(a)(i) of the ESI regulations, which defines a minimum performance criteria that for an intact transmission system, no more than 25 MW is capable of being interrupted by a credible contingency event e.g. the post-radialising condition .

As such, Transend considers that the existing system is not compliant, and as such, options should be considered under the reliability limb of the regulatory test.

Transend has considered two options to address this need:

- a *110 kV upgrade option*, involving the upgrade of the existing 110 kV lines to a design operating temperature of 75° (this project), and
- a *220 kV new circuit option*, involving the construction of a second 220 kV circuit from Sheffield to Burnie.

The options are part of a broader medium-term plan to upgrade the supply to Burnie. As such, Transend's analysis has considered the two options within the broader plans, to determine which results in the least-cost overall plan. Essentially, the 110 kV upgrade option plus some other works defers the need for the 220 kV new circuit option until 2023.

The plan involving the 110 kV upgrade option was found to have the lowest cost (\$27 million vs \$42 million) and highest net benefit (\$193 million vs 177 million), in present value terms.

It is worth noting that the benefits were largely due to reductions in unserved energy, of which both plans resulted in similar benefits, approximately \$220 million. Hence, the lower capital cost of the 110 kV upgrade option is the main determinant of the preferred option.

⁷⁹ The percentage of maximum demand exceeding the supply limit in 2008 is not explicitly provided in the S-B CPIR. However, Nuttall Consulting estimates this to be 19% (131 MW summer maximum demand and a supply limit of 110 MW).

The project is presently planned to be completed prior to the winter of 2013; however, Transend has noted in its S-B CPIR that it is considering bringing the project forward in light of the events in January 2009.

5.2. Nuttall Consulting review

Nuttall Consulting has reviewed the information provided by Transend in support of this project.

The main information that has informed this review includes:

- Transend's Capital Project Investment Review associated with this project, which summarises the justification for this project; and
- Transend's Northwest area - Regional Plan, which details Transend's plans for the development of the North West area transmission network (Northwest regional plan).

On-site discussions with Transend staff have been held, and further clarifications and information requests on a number of matters have been requested of and provided by Transend. The most relevant of these matters are discussed here.

Nuttall Consulting's overall finding from this review is that Transend has reasonably demonstrated that it will be prudent and efficient to undertake the project as proposed, based upon the current demand forecast for that region.

Furthermore, based upon the preliminary 2009 forecast, we still consider it reasonably likely that it will remain prudent and efficient to undertake the project as proposed. This is due to our view that the existing network appears to be on the cusp of non-compliance due to the existing demand levels and Transend's preliminary forecast for this region is higher than the previous forecast.

That said, if a revised 2009 forecast is prepared prior to the AER's final decision that indicates that the Burnie summer demand may reduce from existing levels then the AER may need to reconsider this recommendation.

In the sections that follow, we discuss the three main factors that relate to our recommendation above, namely:

- **the need**, covering the non-compliance issue based upon the original proposal;
- **reasonable alternatives** to address the non-compliance issue; and
- the **2009 revised load forecast**.

5.2.1. The need in the original proposal

As noted in the background section above, Transend considers that its existing network is non-compliant with a number of obligations. It has stated that the compliance matters relate to NER and ESI network performance regulations, namely:

- NER 4.3.1 – power system security;

- NER S5.1.2.1 and S5.1.2.2(a) – sufficient transfer capability for normal conditions; and
- ESI regulation 5(1)(a)(i) – no more than 25 MW of involuntary load shedding for credible contingencies.

With regard to the power system security obligation (NER 4.3.1), Nuttall Consulting accepts that this may result in the need to radialise or even load shed. However, it is important to note that there is no direct non-compliance issue here i.e. a date at which Transend will no longer comply with these obligations. The relevant matter here is that ensuring compliance with this obligation may result in non-compliance with other obligations e.g. the ESI obligations.

Furthermore, Nuttall Consulting accepts that there is the potential for non-compliance issues associated with S5.1.2.1 and S5.1.2.2(a), which concerns the provision of sufficient transfer capability for normal operation. However, Transend has only advised that these issues arose during January 2009. Moreover, it appears to be due to the line ratings being significantly de-rated for a relatively short period of time due to the ambient conditions via its use of dynamic ratings.

It is not clear how extreme these conditions were or the period, and as such, how likely it is that load would indeed need to be shed in the near future for similar reasons – given shedding did not occur in January 2009. Therefore, we do not consider that Transend has adequately demonstrated that non-compliance with these obligations is a reasonable need for this project.

In Nuttall Consulting's opinion, the more significant compliance issue concerns the jurisdictional ESI obligation. As such, the remainder of this section concerns the non-compliance with this obligation.

Transend's S-B CPIR states that the actual 2008 Burnie region summer maximum demand was 131 MW and the total summer design rating of the Sheffield-Burnie 110 kV line is 110 MVA. Within a review of this form, it is difficult to confirm these matters; however, we see no reason to dispute them either. Therefore, we accept that it is justified that radialising may be required to maintain system security for this region at times of high summer demand. Moreover, if radialisation occurred then more than 25 MW of demand would be exposed to shedding following a credible contingency. Therefore, there is some case that the existing system is non-compliant with the ESI obligation as considered by Transend.

Nevertheless, it also appears from Transend's S-B CPIR that the peak demand conditions in the summers of 2007 and 2008 were both able to be managed without radialisation due to the use of dynamic rating and the output of the Woolnorth wind farm, which both resulted in the Burnie demand not exceeding the "firm" line rating at that time.

As such, it appears that, although theoretically the system could be considered non-compliant, it is not clear how likely non-compliance actually is. The issue here is how the dynamic ratings and output of Woolnorth should be treated with respect to assessing non-compliance from a planning perspective. The important points here are as follows:

- Dynamic rating may provide additional capability if ambient conditions allow. Transend has stated in its S-B CPIR that this may be as much as 20%, resulting in a "firm" line ratings of approximately 132 MVA. However, this may not always be

the case, and there is the possibility, as occurred in January 2009, that line ratings could be determined to be below design ratings. Nevertheless, we would expect that, on average, a material increase in ratings is achieved via the application of dynamic rating. Therefore, the likelihood of radialisation (and therefore non-compliance) should be reduced materially.

- Nuttall Consulting understands that the Woolnorth wind farm capacity is approximately 140 MW. As such, if this wind farm is operating with even a modest output, it would be unlikely that radialisation would be required. However, the output of the wind farm is variable, and there is no certainty that it will be available, or can be made available, at times of peak demand. Nevertheless, as with the dynamic ratings, we would expect that, on average, the likelihood of radialisation (and therefore non-compliance) should be reduced by the generation.

Unfortunately, the ESI network performance regulations provide no guidance of how these matters should be assessed in terms of evaluating non-compliance from a planning perspective. Furthermore, Transend has not provided any analysis of these matters to determine the likelihood of non-compliance.

All that said, Nuttall Consulting considers that it is reasonable to assume that the existing network must be at or very near the non-compliance point at this time, given:

- the S-B CPIR states that actual 2007 and 2008 summer maximum demand appears to be approximately 28% and 20% respectively above the design rating of the 110 kV line; and
- Transend's regional plan indicates that there is a significant possibility that no wind farm output, or, at least, very little may be available at times of the regional peak demand.

Nuttall Consulting has assessed Transend's 2008 forecast detailed in its regional plan. Nuttall Consulting understands that this forecast was the basis for Transend's original proposal. Based upon this forecast, Nuttall Consulting estimates that the summer maximum demand for the Burnie area will be similar to the actual demand in 2008, approximately 132 MW⁸⁰. This forecast maximum demand is not significantly greater than the 2008 actual, mainly due to the assumed removal of the industrial load at Port Latta (11 MW). This largely offsets the growth in demand forecast at other substations.

Based upon the above, Nuttall Consulting considers it reasonable to assume that a need will exist to undertake some augmentation for non-compliance with the ESI network performance regulations at the time proposed in Transend's original proposal, based upon the demand forecast associated with that proposal.

However, it is important to note that owing to the assumption concerning the removal of the Port Latta industrial load around 2009/10, the need in the intervening period should reduce. This particular matter will be returned to in Nuttall Consulting discussion on the preliminary 2009 forecast.

⁸⁰ Based upon the individual substation maximum demands and diversity factors in Tables 5 and 6 of Transend's Northwest Regional Plan document.

5.2.2. Alternatives and justification

In the section above, we have accepted that a non-compliance need will exist in the next period, based upon Transend's 2008 demand forecast. Furthermore, this compliance issue concerns the ESI network performance obligation on the 25 MW demand limit for involuntary load shedding following a credible contingency.

As noted in the background section, Transend has evaluated two options to address its view of the need:

- the upgrade of the Sheffield-Burnie 110 kV double circuit line to allow an increase in the design temperature from 49° to 75° – resulting in an increase in the summer design ratings from 55 MVA to 104 MVA; and
- the construction of a new 220 kV circuit from Sheffield to Burnie.

Based upon our review of the need and further discussions and clarifications from Transend, we are satisfied that these two options are the only reasonable alternatives to address these needs in the medium to long term. However, in forming this opinion, we have discussed other opinions with Transend to better understand why these were not considered acceptable for more detailed analysis. The main alternatives involved the following:

- the use of the existing 110 kV circuit from Burnie to Waratah, which is presently operated normally open to avoid constraining generation;
- the use of a special protection scheme to switch the network or load shed in the event of the contingency to ensure compliance with the ESI obligation; and
- network support.

Transend has provided some additional clarifications in a revised S-B CPIR on problems associated with the Burnie-Waratah circuit and the use of a special protection scheme. Based upon our discussion with Transend and the further information provided, we are satisfied that it is unlikely that alternatives involving a special protection scheme would be found to be prudent and efficient following more detailed analysis.

With regard to network support, Transend has advised that the suitability of network support will be assessed through the normal NER processes when the project undergoes a formal regulatory test⁸¹. Transend has also advised that only three generation projects were considered reasonable in the Roam Consulting scenario analysis. None of these were given a high probability of occurring. Further, Transend has received only preliminary connection enquires for two of these, both wind farms. As such, Transend does not consider it reasonable to consider that these may address the need.

Nuttall Consulting accepts that there is sufficient uncertainty regarding a suitable generation alternative. Furthermore, given the scale of the shedding required pre-contingent and possible complications in developing a post-contingent special protection scheme, Nuttall Consulting considers a demand management option is unlikely to be the most efficient.

Therefore, in the context of this review, Nuttall Consulting considers it reasonable at this time to assume a network support alternative is unlikely.

⁸¹ Transend email, dated 6/2/09

Based upon the above, Nuttall Consulting is satisfied that Transend has considered reasonable alternatives in its evaluation at this time.

Nuttall Consulting has not undertaken a detailed review of the costing associated with these projects as the review of Transend's cost estimation processes was undertaken by WorleyParsons and found to be appropriate. Nuttall Consulting has reviewed the scopes of these alternatives and considers them to be reasonable.

Given our comments in the background section that the capital costs of the two alternatives largely drives the least cost and maximum net benefit option, we also consider that Transend has selected the appropriate option to address the need.

5.2.3. The 2009 loads forecast

Transend has provided its preliminary 2009 forecast for each substation in the Northwest area. To assess the significance of this forecast on the Burnie area maximum demand, Nuttall Consulting has estimated the Burnie area summer maximum demand, based upon the substations in the Burnie area⁸² and the diversity factors⁸³ in the Northwest regional plan – see Figure 8⁸⁴.

⁸² This covers Smithton, Port Latta, Hampshire, Burnie, Emu Bay and Ulverstone.

⁸³ Table 6 of Transend's Northwest Regional Plan.

⁸⁴ It is worth noting that at the time of drafting there remains an outstanding query regarding an anomaly in the actual demand for the Burnie area, which is stated as 131 MW in the S-B CPIR, but appears to be around 115 MW on a graph provided during the course of this review (provided in the Transend email, dated 19/2/09). For the avoidance of doubt, the values presented in the figure here are based upon Nuttall Consulting's estimate of the "2009 preliminary" Burnie area summer demand forecast based upon Transend's "2009 preliminary" load forecast data at the individual substation level.

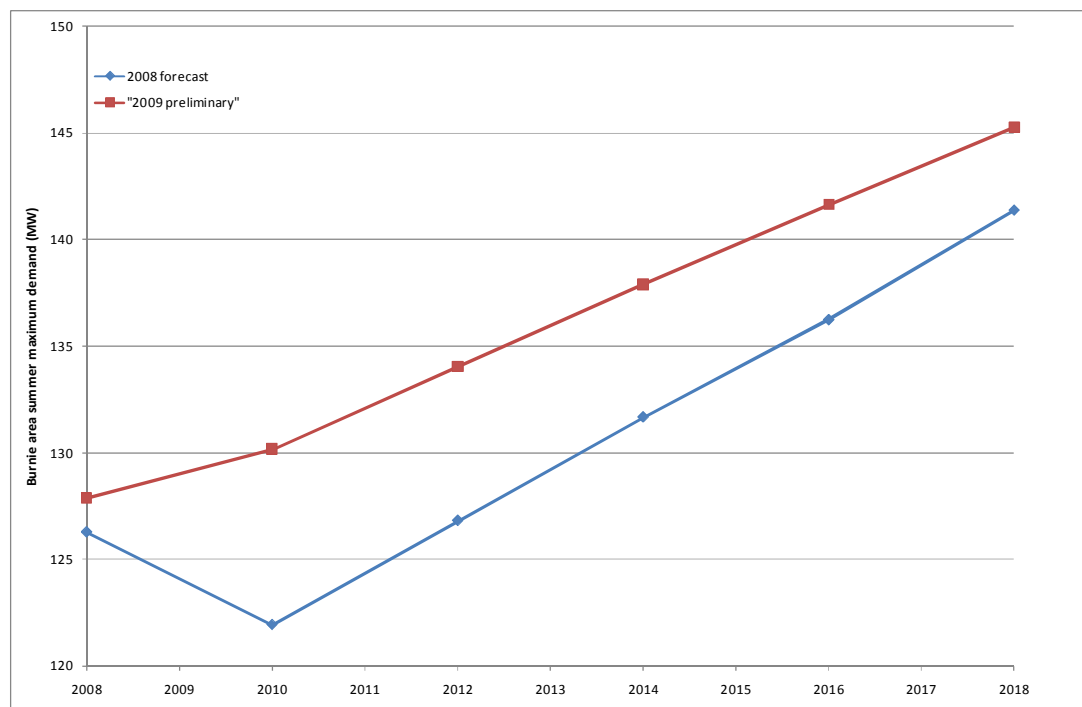


Figure 8 Burnie area load forecast

This figure indicates that the 2009 preliminary forecast is higher than the 2008 forecast. In 2014, the summer maximum demand is forecast to be approximately 6 MW above the 2008 forecast. The increase is largely due to the Port Latta industrial load (10MW after diversity), which, as discussed above, was expected to be removed by 2010 in the 2008 forecast - hence, the reduction in the 2008 forecast for that year. However, in the 2009 preliminary forecast, this load remains.

This addition more than makes up for any reduction in load growth at the other substations that is assumed in the preliminary 2009 forecast.

Due to the significance of this issue, Nuttall Consulting requested a clarification from Transend on this matter. Transend has advised:

“The major industrial customer connected to Port Latta Substation has recently advised as part of the consultation process associated with preparing the 2009 load forecast that, contrary to advice provided in earlier years, the connected load will continue into the future, as identified in the 2009 preliminary load forecast.”

Nuttall Consulting has not been requested to conduct a review of the demand forecast methodology, nor has it been able to validate the above statement. However, it has no evidence to dispute these matters either.

Nuttall Consulting considers that the increased demand in the preliminary 2009 forecast only strengthens Transend's case that it will be prudent and efficient to undertake the project as proposed, and as such, some allowance for this project is still warranted.

Nevertheless, it is important to note that Transend has advised that this forecast is only preliminary. Given also that Transend's forecast for the Southern region showed no significant change, but the overall state growth is expecting to reduce from that forecast in

2008⁸⁵, it may be prudent for the AER to reconsider this matter in light of any updates to the load forecast that may occur prior to its final decision.

Within the context of the finding of this review, this matter will be particularly relevant if a revised forecast indicates that the summer maximum demand for the Burnie area may reduce from existing levels e.g. if it become less likely that the industrial customer at Port Latta will remain connected.

5.3. Summary and recommendations

Nuttall Consulting has reviewed the documentation provided by Transend to support the Sheffield-Burnie 110 kV line augmentation. Nuttall Consulting has also held discussions with Transend on this project and requested further information from Transend on a number of matters.

Based upon our review, Nuttall Consulting considers that Transend has adequately demonstrated that it will be prudent and efficient to undertake the project as proposed, based upon the current demand forecast for that region.

Furthermore, based upon the preliminary 2009 forecast, we still consider that the case is strengthened, owing to the fact that the 2009 forecast predicts a higher summer maximum demand in the Burnie areas over the next review period.

That said, if a revised 2009 forecast is prepared prior to the AER's final decision that indicates that the Burnie summer demand may reduce from existing levels then the AER may need to reconsider this recommendation.

In the context of the overall ex ante allowance, it is worth noting that Nuttall Consulting considers that there is still a moderate level of discretion in the timing of projects such as these, even though they appear as compliance issues. This concerns the fact that the timing of non-compliance is related to Transend's assumptions on dynamic ratings and the generation output in its planning analysis. In Nuttall Consulting's opinion, there is a level of ambiguity in the ESI performance regulations as to how these matters should be addressed. This may provide Transend with some discretion over its timing.

In this project, the timing appeared reasonable considering the demand level was significantly above the strict application of the design rating for the particular circumstances reviewed. However, the relevance of the acceptance here should not be transferred across to any other compliance related projects within Transend's proposal or other regulatory revenue proposals.

⁸⁵ Aurora letter in Appendix 11 of Transend's proposal

6. Operational Telecommunications

6.1. Background and appreciation

Transend owns and operates the electricity transmission system in Tasmania. In order to operate its transmission system, Transend requires telecommunications services to assist it to monitor and control its substation assets, to provide tele-protection over its transmission lines and to provide operational voice communications (“operational telecommunications services”).

Transend's original revenue proposal explained that Transend was in commercial negotiations with its operational telecommunications service provider to procure the telecommunications component of that business. Transend also noted that it would provide revised costs for this function if these negotiations resulted in materially different costs for the forthcoming regulatory control period.

In its draft determination, the AER noted the potential changes to corporate costs resulting from the purchase of the telecommunications business and agreed to review these costs if new information were provided in a revised submission.

Transend agreed commercial terms and conditions and acquired the telecommunications business from Hydro Tasmania in November 2008.

Following this acquisition, Transend reviewed its forecast telecommunication costs with the assistance of Acutel Consulting Pty Ltd (Acutel). Transend stated that the principal rationale for amending the forecast telecommunication costs is that the original Transend forecast was based on the existing contract terms and conditions at the time and, accordingly, did not allow for any escalation in labour costs.

Transend considers that the forecast was therefore inconsistent with other operating expenditure categories, which included labour escalation rates. Transend's revised telecommunications costs⁸⁶ are forecast to increase by approximately \$1.6 million (real 2008–09 dollars) over the forthcoming regulatory control period. This represents a 9.3% increase from the amount of \$17.4 million for this operational item in Transend's original proposal.

Nuttall Consulting has been contracted by the AER to assess the efficiency of the Transend operational communications operating expenditure for the next regulatory period. Specifically, the AER is seeking to establish whether the AER should be satisfied that the costs proposed to be incurred for communications services are efficient when assessed against the operating expenditure criteria in clause 6A.6.6(c) overall and, in particular, clause 6A.6.6(c)(2).

The AER has advised that the previous opinion of WorleyParsons concerning the costs of communication services to be of limited relevance. The AER has also advised that time and

⁸⁶ Included in the field operations and maintenance expenditure category.

information limitations preclude undertaking an analysis based on the costs that would be incurred were the assets involved in providing communication services to be admitted to the regulated asset base.

6.2. Nuttall Consulting review

6.2.1. Application reconciliation

As the first step in assessing the Transend's revised proposal for operational telecommunications, Nuttall Consulting has sought to reconcile the calculation process undertaken by Transend to develop the additional expenditures.

Based on the review undertaken by Acutel⁸⁷, Transend has assessed the labour component of the operational telecommunications service at 60% of overall annual expenditure. The following table provides a reconciliation of the process adopted by Transend to escalate the labour component of the operational telecommunications business.

Table 4 – Operational telecommunications reconciliation

Operational Telecommunications (OT)	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total⁸⁸
Original Transend proposal⁸⁹	2.66	2.85	3.03	3.20	3.38	3.48	3.66	3.66	17.38
Labour component (60%)	1.60	1.71	1.82	1.92	2.03	2.09	2.20	2.20	10.43
Labour growth escalator (%)		1.00	1.03	1.06	1.10	1.13	1.16	1.18	-
Escalated OT Labour		1.71	1.86	2.04	2.24	2.36	2.54	2.59	11.76
Labour growth		0.00	0.05	0.12	0.21	0.27	0.35	0.39	1.34
Revised OT (calculated)		2.85	3.08	3.32	3.59	3.75	4.01	4.06	18.71
Revised OT (Transend)⁹⁰	2.70	2.89	3.12	3.37	3.64	3.80	4.07	4.12	18.99

6.2.2. Business acquisition

In November 2008 Transend agreed commercial terms and conditions, and acquired the operational telecommunications business from Hydro Tasmania. The operational telecommunications business provides monitoring and control of substation assets, tele-protection over transmission lines, and operational voice communications.

Nuttall Consulting considers that the purchase of these assets is consistent with the core business of a Transmission Network Service Provider (TNSP). Nuttall Consulting is not aware of any other TNSP in the National Electricity Market (NEM) that contracts out this group of services.

⁸⁷ Acutel Consulting, Review of escalation of operational telecommunications costs, January 2009, Appendix 9 of Transend's revised proposal.

⁸⁸ Total for the forecast regulatory period.

⁸⁹ Transend Revenue Proposal - Appendix 3 Submission guidelines - Cost information.xlsx

⁹⁰ Transend Revised Revenue Proposal - Opex Forecasting Model for Revised Revenue Proposal FINAL.xls

It would appear that the historical separation of this service from Transend was a function of the short timeframes involved in the disaggregation of the state electricity industry and the distributed nature of the Tasmanian generation locations.

The operational telecommunications business provides additional services that are not regulated under section 6A of the National Electricity Rules (NER), including telecommunications services to Hydro Tasmania, Aurora Energy, Air Services Australia and the State Government for mobile radio . Transend has advised that the additional services provided by the operational telecommunications business are “ring fenced” and that there are appropriate procedures in place to ensure the separation of prescribed and non-prescribed expenditures. Nuttall Consulting has not reviewed Transend's ring fencing arrangements.

6.2.3. Initial operating expenditures

Table 4 above provides the original operating expenditure forecasts for the operational telecommunications business based on information provided by Hydro Tasmania at that time. These figures were not based on a formal contract.

Transend has advised that Hydro Tasmania had indicated an intention to revisit the operational telecommunications charges to ensure that they were sustainable in the longer term. As the business was subsequently sold, it is not clear as to whether Hydro Tasmania would have sought increases to these forecasts or not when the contract was renewed.

The Hydro Tasmania media⁹¹ release regarding the sale of the operational telecommunications business identified that the business was part of the core operations of Transend. This suggests that the business was considered not to be so central to the operations of Hydro Tasmania. The media release does not suggest that the sale of the business was due to financial pressures or any lack of sustainability in the business.

Transend's historical expenditures for operational telecommunications have been increasing in line with the previous agreement with Hydro Tasmania.

On this basis, there is no reason to suggest that the historical expenditures were below competitive levels. This is consistent with the starting point put forward for operational telecommunications by Transend in its revised proposal.

6.2.4. Asset acquisition

Transend purchased the operational telecommunications business from Hydro Tasmania in November 2008. Nuttall Consulting has reviewed the business case information relating to the purchase⁹². It is clear from the information provided that Transend undertook a detailed review of the operational telecommunications business and sought independent expert advice relating to a number of matters concerning the purchase.

⁹¹

<http://www.hydro.com.au/home/Corporate/Publications/Media+Releases/Sale+of+Hydro+Tasmania+telecoms+business+to+Transend.htm>

⁹² Acquisition of Hydro Tasmania Telecommunications Business, Transend Board Paper - 26 June 2008.

The Transend business case and acquisition review identifies two key drivers for the purchase:

- that the commercial terms of the sale were to the satisfaction of Transend as well as Transend being able to derive a commercial return on investment; and
- a strategic imperative to control the future stewardship, operation and development of the telecommunications network.

The business case also identifies additional opportunities resulting from the purchase in terms of business synergies. The business case identifies that there are a number of synergies between Transend and Hydro Tasmania Telecommunications Business (HTTB) that over time would provide value to Transend and its shareholders. These synergies were not included in the financial assessment of the purchase due diligence, although the document identifies that Transend is aiming to realise these benefits when HTTB is integrated into Transend.

The key synergies relating to operating expenditure as identified in the Transend business case⁹³ are:

- a) Focus on internal needs: Ensuring that work is prioritised correctly to fit in with Transend's operational requirements and capital program;*
- b) Integrated operations: Streamlining personnel administrating telecommunications and associated operational and business data networks;*
- c) Regulated income: Future opportunity to reduce regulated operational expenditure by converting some telecommunications expenditure from opex to capex;*
- d) 24-hour support duplication: Reduce duplication of 24-hour monitoring systems and support personnel.*

Transend identified that “*the best opportunities for value creation*” included items (a), (b) and (c).

Item (c) above is not considered relevant to this review as a building block assessment of the operational telecommunications business is not within the scope of this review. It is clear from the remaining items above that Transend anticipates future operating expenditure savings to be realised. The quantum of these savings has not yet been determined, and has not been included in the Transend financial assessments to date.

Nuttall Consulting considers that the time taken to achieve the potential efficiencies may vary. However, as the operational telecommunications business was transferred in November 2008, it would be reasonable to assume that the majority of the efficiency opportunities could be achieved by the commencement or early into the next regulatory control period. This is consistent with the Transend business case stating “*aiming to realise these benefits will be a key focus when looking at how HTTB is integrated into Transend*”.

There are no firm techniques or rules for establishing efficiency opportunities. This is a very qualitative area and difficult to accurately assess. A simple option would be to ignore the efficiency opportunities. However, Transend has requested additional revenues as a result of

⁹³ Ibid

the acquisition of this business and it is therefore necessary to consider the balance of additional costs and potential savings.

Transend has clearly identified that it considers opportunities for merger efficiencies to exist, and has identified certain efficiencies to be most likely to be realised. On this basis, it would be unreasonable not to recognise some level of efficiency gain. If the efficiencies identified by Transend were not recognised this would result in profit being disproportionately allocated to non-prescribed activities.

Our assessment of the (a) and (b) business efficiencies is provided below.

6.2.4.1. Synergy A – integrated operations and work prioritisation

Transend has provided an organisation structure for the telecommunications business at the time of transfer to Transend⁹⁴. Transend stated that the structure provided supports the delivery of all of the telecommunications services to Transend and external clients.

An assessment of the titles of the 34 staff provides the following:

- managers, supervisors and co-ordinators: 9 staff (1 acting out);
- technical and engineering: 21 staff (including draftsmen); and
- business support, officers and analysts: 4 staff.

Synergy A, as identified by Transend, considers operating expenditure opportunities relating to work prioritisation. The staff that are potentially involved in the prioritisation of works would include managers, supervisors and co-ordinators – a total of 9 staff.

The benefits of works prioritisation would impact both operating and capital expenditures for the operational telecommunications business and the broader regulated business. However, Nuttall Consulting has limited its assessment of potential efficiencies to the operational telecommunications business only.

The benefits of integrated operations should result in improved jobsite co-ordination. The demarcation of asset ownership is no longer an issue in the joint business and therefore constraints of operations should be significantly lessened. Audits and inspections of contract work are no longer required, and may be replaced by a single internal review.

Transend has stated that the potential benefits in this area are difficult to evaluate at this point in time. Nuttall Consulting concurs that opportunities to undertake maintenance of the transmission systems and manage related telecommunication issues is limited to some extent by the availability of planned outages, which are known well in advance, and so planning for such events is already well co-ordinated.

Transend has also identified that a significant cost of bearer services relates to the maintenance of the telecommunication assets, which operate independently of the transmission system. In addition, any cost reductions for capital related projects will result in lower asset values and the benefits ultimately passed on to customers in future regulatory period via lower depreciation and interest charges.

⁹⁴ Telecommunications Services Business Performance - staff graph.pdf

It is clear that Transend has anticipated expenditure savings in this area. However, Nuttall Consulting concurs with Transend that these savings are difficult to determine in advance. On this basis, Nuttall Consulting recommends that no efficiency savings are anticipated at this time, and that AER consider this area at a later date.

6.2.4.2. Synergy B – streamlining administration and data networks

The Transend business case identified the following opportunity for value creation: “*Streamlining personnel administrating telecommunications and associated operational and business data networks*”.

As operational telecommunications is now a part of the overall Transend business⁹⁵, contracts, external invoicing, payment management, etc are no longer required.

This will predominantly impact administration and support staff as they typically handle the routine administration of contracts, payments and invoicing. On a less regular basis, management effort may also be reduced as the need to establish and/or renegotiate contracts and terms is also removed.

Transend has also identified that the personnel administering data networks will also present an opportunity for streamlining.

The benefits of improved administration will predominantly impact operating expenditure.

Transend has identified savings from streamlining the administration of the telecommunications are expected during the 2009-14 regulatory control period. Transend has stated that “*the structure of the telecommunications group will only be considered after the effective transitioning and appropriate bedding down period in Transend*”.

Transend has forecast savings for the communications group as follows⁹⁶:

- 75% of a full time equivalent band 3 employee. For the purposes of this exercise it is assumed that a saving of \$60k will apply and will be effective from mid 2011.
- 50% of a full time equivalent band 5 employee. The expected saving including labour on-costs is \$55k per annum and effective from 2009-10 onwards.

Nuttall Consulting considers that the above savings are reasonable and accepts the position put forward by Transend.

6.2.5. Labour component of operating expenditure

To determine a labour allocation, Transend contracted Acutel Consulting (Acutel) to undertake a review of the costs that are applicable to the provision of Transend's operational telecommunications service. The Acutel report is provided as Appendix 9 of the Transend Revised Revenue Proposal.

In apportioning the costs between labour and non-labour, Acutel considered that the following costs types were included as 100% labour costs:

⁹⁵ Noting that it remains a ring fenced operation for the immediate future.

⁹⁶ Email of 25 Feb 09 - AER information request 330 per 23-27 Feb 09

- salaries and wages;
- allowances;
- overtime;
- payroll Tax;
- contract Labour;
- professional services; and
- consulting charges.

In addition, the following cost types were included as 90% labour costs:

- ACMA⁹⁷ Licence Fees (recovery of ACMA and suppliers labour).

Nuttall Consulting has reviewed the labour cost group allocations and considers that the majority of the categories are considered reasonable. With the exception of licence fees, the above cost categories appear to be consistent with the Australian Bureau of Statistics definition for Average Weekly Earnings⁹⁸.

Nuttall Consulting has concerns with the labour allocation allowed for ACMA licence fees. This is discussed below.

6.2.5.1. Licence fees

The Transend operational telecommunications business incurs license fees relating to the provision of microwave network radio frequency services⁹⁹. These licence fees are set by ACMA.

In its report, Acutel stated that “A brief review of the publicly available ACMA Budget papers supports a high apportionment of labour to non labour expenses associated with this cost type”¹⁰⁰.

Nuttall Consulting has reviewed the ACMA financial statement information for the most recent financial year where information is publicly available - 2007/08¹⁰¹. This report identifies more than \$431 million in broadcasting licence and radiocom taxes against total ACMA expenses of \$99 million. Although ACMA does not have direct access to the total collected fees and taxes, it is clear that the overall labour component is only a small proportion of total licences and tax revenue.

The financial statement also identified \$97 million in revenues from Government. Nuttall Consulting has not included this figure in calculating the labour allocation as it is not directly related to the determination of license and taxes.

⁹⁷ Australian Communications and Media Authority.

⁹⁸ Australian Bureau of Statistics: 6302.0 - Average Weekly Earnings, Australia, Aug 2008.

⁹⁹ Including 1.5 and 10 GHz fixed (point-to-point) services.

¹⁰⁰ Acutel Consulting, Review of escalation of operational telecommunications costs, January 2009.

¹⁰¹ ACMA Annual Report 2007/08.

The expenditures relating to employee benefits¹⁰² detailed in the ACMA financial statements are less than \$55 million.

It is arguable that the ACMA inclusion of separation and redundancy payments in the employee benefits should be removed for the calculation of a labour component, as these costs are not considered part of the average weekly wage according to the ABS definition¹⁰³. This would have the impact of reducing the percentage of the employee benefits figure that is relevant to this assessment.

The ACMA financial statement also identifies \$26 million in services rendered by external entities and \$1.7 million in services rendered by related entities. It is not clear what proportion of these services would be labour, but it is reasonable to assume that a material percentage would be labour related. Nuttall Consulting has assumed a 50% labour allocation for these services.

The information from the 2007/08 ACMA financial statements results in a labour allocation of 15.7%, not the 90% assumption provided by Acutel.

Acutel provided a response to Nuttall Consulting's inquiry on this matter¹⁰⁴. The response summary stated that "*there is a strong argument that the charges for Radiocommunications Apparatus Licence fees are calculated on a cost recovery basis*". It was the view of Alcatel that "*radiocommunications taxes are levied on a cost recovery basis and the other Fees and Charges included are not*".

However, the 2008/09 ACMA report into "Agency resources and planned performance"¹⁰⁵ states that "*Taxation Revenue - Represents the collection of taxes and fees on behalf of the Government. It includes Broadcasting Licence Fees, Radiocommunications Taxes and the Annual Numbering Charge. These funds are remitted to the Official Public Account and are not available to be used by ACMA for its own purposes.*"

Nuttall Consulting considers that this statement clearly indicates that radiocommunication taxes are part of the overall taxation revenue.

ACMA pricing principles include an opportunity cost that is priced at the value of the spectrum denied or best alternative use of that spectrum. If the opportunity cost is less than the indirect costs, taxes should only recover ACMA costs.

From the above, it is clear that the radiocommunication taxes are based on an opportunity cost methodology and not based on cost recovery alone. This clearly invalidates the assumption that 90% of the Transend licence fees are labour related.

It may be possible for ACMA to provide a more accurate assessment of the true value of the labour component associated with the Transend licences. As this information is not currently available, Nuttall Consulting has relied on the overall ACMA relationship between taxes collected and operating expenses - 15.7%.

¹⁰² Including wages and salaries, superannuation, leave and other entitlements, separation and redundancies.

¹⁰³ Australian Bureau of Statistics: 6302.0 - Average Weekly Earnings, Australia, Aug 2008.

¹⁰⁴ Email received 24 Feb 2009 - AER information request 327 per 23-27 Feb 09

¹⁰⁵ Australian Communications and Media Authority - Agency resources and planned performance, 2008/09.

6.2.6. Internal margins

Transend has advised that an administrative margin of 1.5% is applied to certain pass through costs (e.g. Telstra charges). The value of this administrative margin equates to approximately \$5000 per annum¹⁰⁶.

Nuttall Consulting considers that this represents a double-recovery as the administrative costs (i.e. administrative labour and overheads) are already captured in the other cost categories.

Nuttall Consulting was concerned to ensure that double counting had not occurred in other cost categories. Transend has provided an assurance to Nuttall Consulting that this administrative margin is not applied in any other areas of the operational telecommunications business.

6.3. Summary and recommendations

The following table provides a summary of the review of operational telecommunications and the recommended changes to the proposed operational telecommunications operating expenditure.

Table 5 – Operational telecommunications recommendation

<i>Operational Telecommunications (OT)</i>	<i>2006-07</i>	<i>2007-08</i>	<i>2008-09</i>	<i>2009-10</i>	<i>2010-11</i>	<i>2011-12</i>	<i>2012-13</i>	<i>2013-14</i>	<i>Total¹⁰⁷</i>
Revised OT (Transend)	2.70	2.89	3.12	3.37	3.64	3.80	4.07	4.12	18.99
Labour allocation	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.03	-0.04	-0.13
Administrative overhead	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03
Efficiency reduction	0.00	0.00	0.00	-0.02	-0.02	-0.04	-0.04	-0.04	-0.16
Recommended OT	2.70	2.89	3.11	3.33	3.60	3.73	3.99	4.03	18.68

¹⁰⁶ Email dated 25 Feb 2009- AER information request 330 per 23-27 Feb 09

¹⁰⁷ Total for the forecast regulatory period.