TRANSEND

APPENDIX 21

Marsh, *Transend Self-Insurance Risk Quantification Report,* May 2008

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Transend
Self Insurance Risk Quantification Report

MARSH

7 May 2008

Marsh & McLennan Companies
Marsh & McLennan Companies



Contents

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Executive Summary

Overall, this study has found additional risks not previously included in the budget that have an approximate value of $755k per year on average. This is comprised of $240k due to general liability risks and $515k due to property risks.

The general outcome of the process has concluded that Transend has relatively little risk that is unaccounted for already. This is an expected result due to the highly sophisticated risk profiling processes that are currently in place throughout Transend. For instance, the exposures to bushfire seem well understood and controlled for, including the current arrangements regarding the clearing of vegetation and maintenance schedules, as well as the insurances in place.

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Background

In August 2005, Marsh produced a report entitled “The Bushfire Liability Study” relating to the liability Transend might face if it were to cause a major bush fire resulting in significant damage. The report contained an approximate Maximum Foreseeable Loss in relation to this liability in order to recommend an appropriate limit for the liability insurances.

More recently, Marsh assisted Transend with the Business Impact Assessment review. This involved the construction of a comprehensive database of risks faced by asset class and location.

Transend has not previously included any consideration for operational risk into the calculation for the purposes of the “Revenue Reset” process conducted every 5 years with the AER (“Australian Energy Regulator”). Marsh was asked by Transend to assist in quantifying any self insurance allowance in relation to operational risks.

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The Brief

Marsh was engaged by Transend to quantify Transend's estimated level of self insured losses for its business risks.

These self insured losses consisted of:

- Insurable risks below the existing insurance deductibles; and
- Other self insured risks that had a material contribution to the expected losses and a reasonable likelihood of occurrence.

The scope of the project is consistent with the revenue reset process as laid out by the AER. As such, certain categories of risk have been excluded from our review, such as strategy and pricing risks.

Overall, the scope of the project involved gathering internal data from Transend, and conducting internal workshops on risk identification/quantification to focus on those risks that had not, in the opinion of Transend, been included in the current forecasts put forward to the AER.

Marsh's industry experience, knowledge and data was able to be utilised. Marsh was able to bring together a relevant set of industry information with which to perform a quantification exercise, and thereby gain an estimate of Transend's annual exposure.

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Our Approach, Timing & Outcomes

In order to achieve the objectives of the Brief the following approach was formulated:

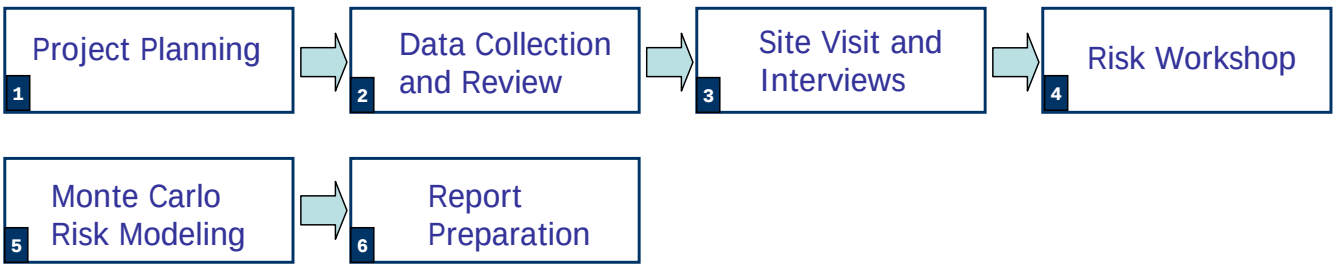
- To focus on the quantification of risk-exposures, which have been identified through previous work, alleviating the necessity for protracted workshops and interviews to update the risk register.
- Further detail for each risk would be provided by Transend as necessary to allow Marsh to perform reasonable calculations.
- To ensure project's results would be as comprehensive as possible.
- Only operational risks would be considered, as has been previously determined.
- To ensure the self insurance allowance levels are determined in the context of each risk's specific frequency and severity profile.
- To exclude those costs already embedded in the budget.
- To ensure an independent perspective of the Transend;s self insurance allowance calculations.

Given the above outlined approach, Marsh has devised a process outline that was to be:

- Comprehensive enough so that risks would be quantified in a comprehensive – yet – independent way.
- Simple enough so that it could be easily & quickly implemented within the available timeframes.

In order to meet these two requirements, we followed a phased & interactive process which we present below:

Figure 1 - Project Phases



A description of each phase is provided below:

Table 1 - Project Phase Details

	Description	Process/Timing	Deliverables
1	**Project Planning** Discussion on, and finalization of, project goals, process, outcome, etc.	Company & Marsh meetings	Finalization of project: • Goals & objectives • Process & methodology • Deliverables • Schedule • Professional fees
2	**Data Collection and Review** The collection of Transend, Marsh and Public information destined to help the Marsh Project Team identify Transend's risk exposures.	Internal and external discussions and research	Data such as: • Annual report • High-level statistics of the Company's IT system & architecture security failures • Various Company statistics (e.g. legal proceedings, event logs) • Marsh and Public data (e.g. bushfire reports)
3	**Site Visit and Interviews** Discussions with members of the Company's management team	1.5 day on-site visit to Transend by a consultant analyst.	• An enhanced understanding of the Company's: o Business processes o Internal controls o Risk management systems & processes • Additional information on identified critical risks • A list of information to be collected by interviewees, and to be provided to the Project Teams
4	**Risk Categorisation** Internal determination of risk analysis method for each critical risk	Marsh internal meetings	Determination of those risks to be quantified through scenarios or Monte Carlo models
5	**Monte Carlo Risk Modelling**	Marsh Analyst development of Monte Carlo models	Cost calculations as a function of statistical simulation models built for each risk where sufficient information is available
6	**Report Preparation**	Production of draft and full report	Draft version of final report for review by the Company Full version to be released after review by the Company

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Reliances and Limitations

This report has been prepared by Marsh Pty Ltd for Transend to quantify the identified risks as part of the revenue reset project. The report is not intended to be used for any other purpose and may not be suitable for any other use. Opinion and estimates contained in the Report constitute our judgement as of the date of the Report and are subject to change without notice.

In preparing this report, Marsh has relied on information supplied to it from various sources and has assumed that the information is accurate and complete in all material respects. Marsh has not independently verified or estimated the reliability, accuracy or completeness of the data and information used for this report and was not provided with the information required to carry out such a verification exercise.

Although Marsh has made use of generally accepted actuarial techniques, this report should not be regarded as a formal “statement of actuarial opinion”.

Except insofar as liability under statute cannot be excluded, Marsh, its directors, employees and agents will not be held liable for any loss or damage of any kind arising as a consequence of any use of the report or purported reliance on the report including any errors in, or omissions from, the utilised models.

The report must be read in its entirety. Individual sections of the report could be misleading if considered in isolation from each other. In particular, the opinions expressed in this report are based on a number of assumptions and qualifications which may not be discussed in their entirety in the relevant sections of this report.

It should be noted that the modelling undertaken does not and cannot take into consideration changes in Transend’s risk profile nor does it take into consideration changes in the legal or socioeconomic environment that may directly affect the frequency and cost of claims.

In addition, the modelling methodology undertaken in this report does not and cannot predict the likelihood and severity of catastrophe/mass tort liability losses.

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Risk Workshops

On 19 February 2008, Leigh Burrill from Transend arranged for Cynon Sonkkila and Terry Bryan from Marsh to conduct a number of interviews with senior staff regarding operational risk issues.

The risks included uninsured property exposures and liability exposures that would fall outside the insurances currently purchased by Transend. The events considered were those viewed to have a material probability of breaching the limit or sublimit of the relevant policy, or the component of the loss which may be within the deductible.

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Risk Identification

Prior to the workshop, an indicative list of possible sources of risk that had not so far been accounted for in the budget was created. During the course of the workshop, the list was amended. The risks identified on the list were:

1. Property Risk

a) Damage to Towers
b) Lightning strike
c) Wind
d) Ice
e) High temperatures
f) Bushfires
g) Line clashing
h) Subsidence/erosion
    a. sinkholes
    b. road construction
    c. mining nearby
    d. landslide
i) Cascade failure due to line breakage
j) Impact from
    a. wildlife (birds)
    b. trees
    c. aircraft
        i. maintenance
        ii. other light aircraft
    d. heavy vehicles
k) Damage to Substations
    a. Vandalism
    b. Theft (including copper theft)
    c. Terrorism
    d. machinery breakdown
    e. explosive failures in transformers
    f. bush fires
    g. flooding

l) Damage to other Assets
    a. normal office risks
    b. cable fires
    c. control room fires
    d. flooding
m) Business interruption
    a. Failures in supply
    b. Terrorist attack/Malicious damage to Chapel Street or George Town Substations
n) Damage to Vehicles

2. Liability

a) Causing a Bushfire
b) Lightning
c) Impact on tower/lines
    i. tree
    ii. aircraft
    iii. wildlife
d) Broken lines
e) Subcontractors
    i. clearing vegetation
f) Vandalism/terrorism
g) Fire at a substation
h) Employer's Liability
i) Workers compensation recoveries
j) Power fluctuations causing damage to third parties

3. Additional risks

a) Fraud
b) Industrial action
c) Failures in supply from energy producers (Basslink and Tas Hydro)
d) Nemnet failure
e) Unauthorised Access to NOCS or control rooms

These risks are discussed in detail and quantified (if possible or necessary) in the following sections of the report.

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Risk Quantification Methodologies

For each identified critical risk, a method for analysis was devised.

Each risk could be analysed using one of the following:

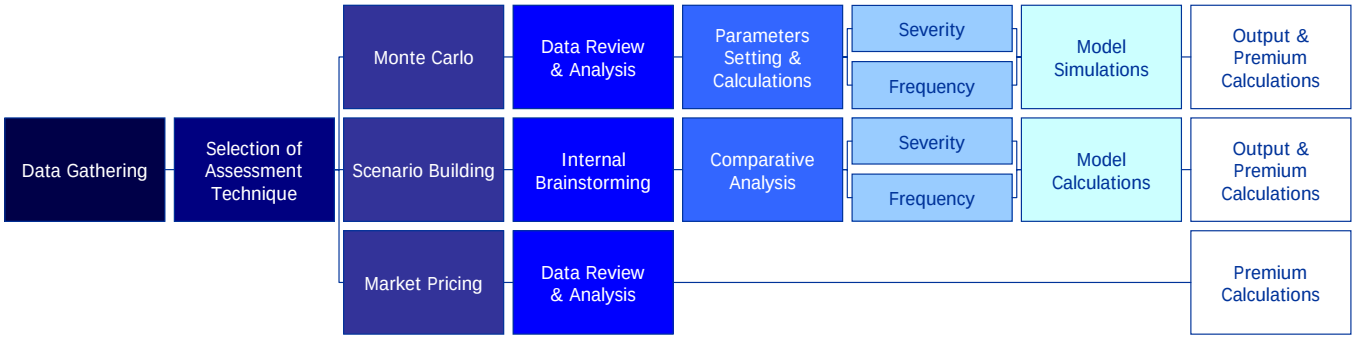
- **Monte Carlo Simulations** – Utilising a separate distribution for both claim severity and claim frequency it is possible to randomly generate a possible future policy year. Monte Carlo simulations are then run over many iterations, thereby giving a representation of possible outcomes for the year ahead.

- **Scenario Building** - series of “inter-connected” scenarios, each being assigned frequency & severity factors. The total amount of risk is defined as the combined frequency & severity factors of all scenarios.

- **Market Pricing** – Based on available internal and external information, Marsh’s marketing team assesses the insurability of the risk and estimates a premium based on current deductibles and limits purchased or available. Standard market rates are used with consideration to underwriters’ perceptions of the risks and present market conditions.

With the risks identified, categorized and prioritized we then moved on to the “Risk Assessment” phase where our objectives were to assess the severity & frequency factors of each key critical risk so as to determine their total annual expected loss values.

The analytical process utilised had the following components:



Three factors influenced the selection of a particular assessment technique:

- The amount and accuracy of the internal data collected.
  - The more data available internally, the less external data required to model the risk appropriately.
  - This is usually the case for higher frequency risks.

- The amount and accuracy of the external data available.
  - For critical risks where there is a significant exposure, additional data may be required to supplement the internal data.
  - Depending on the materiality of the risk, it may be important to carry out additional research to gather enough external data to compile a credible model for the risk.
  - This would be necessary where market pricing of the risk would be impossible.

- The individual nature & profile of the Company's key critical risks.
  - The assessment technique is highly dependent on the nature of risks (i.e. low frequency/high severity vs. high frequency/low severity risks), with the more material risks requiring additional attention and accuracy.

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Property Risks

Many categories of property risk exist within Transend.

The senior staff, having been associated with Transend for a significant period, were able to draw on their own recollections of events in Transend's history. This was invaluable to the process of identifying the likelihood of certain events and their likely consequence levels. Where information did not exist within the company system, it often existed within the collective knowledge of the staff engaged in the exercise.

We considered each of the following specific property risks:

(a) Damage to towers
(b) Lightning strike
(c) Wind
(d) Ice
(e) High temperatures
(f) Bushfires
(g) Conductor clashing
(h) Subsidence/erosion
(i) Cascade failure due to conductor breakage
(j) Impact
(k) Damage to substations
(l) Damage to vehicles
(m) Damage to other assets
(n) Business interruption

9.1 Damage to towers

The main property risks identified were the various ways damage could be caused to the towers. The vast majority of the risks identified are well managed.

9.2 Lightning strike

Damage to transmission line infrastructure may be expected to arise from lightning. Tasmania has a low isokeraunic level of lightning activity and the conductors and towers are designed to withstand all reasonably expected events of this nature. Although it is possible for extreme events (ball lightning was mentioned) to cause damage to the conductors and towers, those type of events have not been observed in either the industry data available, or the known history of Transend.

9.3 Wind

Wind can cover a number of unusual conditions including cyclones, tornadoes, strong winds due to convective forces around bushfires, or strong pressure subsystems around Tasmania.

There have not been any extreme wind events in Transend's history. Industry data indicates a number of high wind events over a 40 year history have resulted in cascade failures. However, Transend believe that these types of failures could not occur as easily for Transend due to the tower and cable construction tolerances.

Of course, wind can cause damage to Transend infrastructure indirectly by causing bushfires or tree impacts, but these occurrences are considered separately.

9.4 Ice

Ice can cause damage to the conductors and towers by weighing them down until they break. This is considered a risk for Transend. It is combated by the use of introducing more current into effected zones, causing higher heat-dissipation and melting the ice. However, in some circumstances this cannot occur, especially when the conductor is turned off for safety reasons. This could give rise to a cascade failure event. But the likelihood of this occurrence is expected to be so low that it was considered to be an immaterial risk, and was excluded from consideration at the workshop.

9.5 High temperatures

High temperatures have been known to cause a conductor to sag and breach safety clearances on hot days.

The damage caused by transmission lines sagging excessively is, in all but the most extreme cases, very light to none. No extreme cases could be identified from Transend's experience. Further, it was indicated that those transmission lines that were affected historically have been modified or operating measures put in place so that the sagging does not create an opportunity for breaching of safety clearances. On this basis, this risk is considered to be very low.

9.6 Bushfires

Bushfires are considered similarly to high temperatures, except for those cases where there is some insulator failure due to carbon deposits. Smoke and fire are not expected to cause significant damage to the conductors or towers as the cables and towers are constructed with these risks in mind.

In addition, bushfires are common enough to have a good knowledge of what to expect throughout Transend's network. The usual situation is for the exposed section to be shut down until the fire has passed, and any repairs/cleaning carried out after the event.

9.7 Conductors Clashing

Occasionally there are instances of conductors clashing, either from the sources mentioned above, or otherwise. These events are expected to cause minor damage only.

9.8 Subsidence/erosion

Towers can be destabilised by a significant change in the ground conditions. These include:

- sinkholes
- road construction
- mining nearby
- landslide

Transend has identified a number of events where repairs are required to account for these exposures, and so far, these exposures have not been accounted for in the budget.

Experience of these events historically include:

- Sinkholes: Sheffield-George Town 220 kV transmission line, potentially 6 towers affected – approximately $1.94M
- Landslips: Farrell – Reece – approximately $100k
- Landslips: Sheffield – Farrell – costs still to be determined but estimated at around $100k
- Landslips: T146 Sheffield – Farrell – Costs to Transend still to be determined but estimated at about $100k.

Approximately $2.24m of damage has occurred over the last 10 years. We suggest that $240k per year be budgeted for this risk going forward.

9.9 Cascade failure due to line breakage

There has been no experience of a cascade failure (where several towers are dragged down at the same time) within Transend's known history. Industry experience suggests that high winds and ice may be capable of causing these events for Transend, but Transend considers the latest design standards of the equipment to be more robust in recent years, and that their current exposure is negligible.

9.10 Impact

Impact can cause damage to the towers or transmission lines.

Some sources include:
- heavy vehicles
- aircraft (maintenance and other light aircraft)
- wildlife (e.g. birds)
- trees

The likely impact from each particular source varies significantly.

Heavy vehicles are capable of destabilising a tower, but the more likely impact would be that an electrical outage might occur and the lines would need to be de-energised.

Aircraft are capable of damaging transmission line infrastructure but this is extremely low. Transend was able to envisage some albeit unlikely scenarios in which extreme damage could occur, but in the majority of these cases it was identified that a third party would generally be responsible for the repair costs. An exception is where the marking of the towers is found to be inappropriate – particularly when there are scheduled flights over the network. The colouring of the towers themselves is designed to make them blend into the landscape, making them harder to see for aesthetic purposes. The markers are designed to make the towers visible to pilots. If the markers are ineffective, there might be a higher incidence of aircraft impacts. No claims against Transend have been brought in relation to the tower markers. Insufficient information is available to quantify this.

There have been three incidents where trees have fallen across Transend lines causing greater than $20k in damage over the last ten years. Total costs for the three incidents was $150k. We would suggest an annual allowance of $15k for this type of risk.

9.11 Damage to substations

Substations are exposed to a number of additional risks identified in the risk register:
- Vandalism
- Theft (including copper theft)
- Terrorism
- Equipment failure
- Major failures in transformers
- Bushfires
- Flooding

Although some of these risks are expected to be extreme risks, such as a catastrophic failure of a transformer, damage to the substations is insured above the deductible. Transend has reviewed the insured limits and considers them to be sufficient and losses in excess of the policy limits are unlikely. There have been 10 instances in the last 14 years of transformer failure. We understand that costs associated with transformer failure is $200k per transformer. On the basis of allowing for one transformer failure occurring during each 18 month period, we suggest an allowance of $135k for this risk.

9.12 Damage to Vehicles

Damage to vehicles seemed, under examination, to be covered by the current budget in terms of under deductible losses, and covered by insurance otherwise.

Motor is typically a relatively high frequency and low severity insurance class, that is well understood and managed. The under deductible losses from the fleet are fairly consistent from year to year, therefore the current budget is considered sufficient to cover the average losses.

9.13 Damage to other Assets

These included:

- Normal office risks
- Cable fires
- Control room fires
- Flooding

9.14 Business Interruption

Loss of revenue is not insured, however it is not a risk due to regulatory regime under which Transend operates.

The increased cost of working to maintain supply/services is insured subject to a $500k deductible in addition to the property deductible.

9.15 Summary

As outlined above, for some risks we are able to draw on historical experience to estimate an expected annual cost. These risks are tabulated below and have an expected annual cost of $390k in total.

Risk	Allowance
Sinkholes/Landslips	$240,000
Trees	$15,000
Transformer failure	$135,000

In addition to these risks, Transend is also exposed to risks which have not occurred historically. Some of these risks are uninsured, and for some Transend's exposure is limited to the insurance deductible.

Transend has no experience of losses, to date, in excess of the $2.5m deductible. It is reasonable to assume that an event of this magnitude could occur as frequently as once in every 20 years. Thus, Transend should retain $125k in respect of their under-deductible exposure to major events.

In total, Transend's exposure to property risks is estimated to be $515k.

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Liability Risks

Liability risk covers those events where Transend may be considered liable for damage, loss or injury to a third party, and there are several ways for this to occur, including:

- Causing a Bushfire
  - Lightning
  - Impact on tower/conductor
    - tree
    - aircraft
    - wildlife
  - Broken conductor
  - Subcontractors
    - clearing vegetation
  - Vandalism/terrorism
  - Fire at a substation
- Employers Liability
- Workers compensation recoveries
- Power fluctuations causing damage to third parties

All of these risks are covered by the Liability and Employers Liability policies that Transend currently purchases, and are acknowledged as unbudgeted expenses by Transend.

The average under deductible amounts for these exposures is estimated in this section of the report.

Industry data on liability losses was available through the Marsh Utility Insurance Liability Program wholesale facility. This data contained relevant loss history for transmission line exposures such as Transend and a relevant set of data was constructed with the assistance of Peter Ovcar, John Laxton and Marsh's claims management practice. The data cannot be reproduced here because of confidentiality reasons. We have used this data, and actuarial forecasting processes, to estimate that Transend may expect an average of approximately $200k (rounded up from the mean Retained Cost in Table 2 of $188.6k) losses per year under the $250k deductible. A summary table is shown below.

Table 2 – Liability Loss Forecasting Results
Amounts shown in $000s

Retained Cost

	$250k Deductible	No Insurance
mean	188.6	590.0
std dev	210.3	2,591.3
Percentiles of Retained Loss Distributions:		
75%	272.3	444.2
80%	324.6	545.2
85%	403.1	748.0
90%	500.0	1,146.7
95%	589.6	2,053.1
99%	894.8	6,516.6

Insurers' Cost

	$250k Deductible	No Insurance
mean	401.4	0.0
std dev	2,524.9	0.0
Percentiles of Retained Loss Distributions:		
75%	82.1	0.0
80%	194.1	0.0
85%	346.3	0.0
90%	579.7	0.0
95%	1,379.5	0.0
99%	6,016.6	0.0

In general, this liability forecast can be expected to indicate average retained losses for all liability events under the deductible (excluding employers' liability which is considered separately below).

Liability claims emanate from a variety of sources. Bushfire exposure, on a yearly basis, contributes very little to the overall estimate.

Bushfire Exposures

Transend would be liable for any damage that it caused to a third party in the event that a fire was started by them.

As this was considered to be the single highest exposure to Transend, significant consulting time was spent discussing various sources of fire around Transend equipment.

Unless Transend was found to have been negligent in maintenance, repair or management, Transend would not be liable for any subsequent damage arising from bushfires (as far as the participants could identify), but it was acknowledged that there is a residual risk that needs to be addressed.

Transend purchases liability cover in the event that it causes a bushfire. There is a deductible of $500k and a limit which was deemed to be adequate to cover a MFL event as indicated in the Marsh report on the bushfire risk.

Some additional research has been carried out to confirm or expose any additional risks, but none have arisen. All industry information and expert opinion available on the topic, including inputs from the Bureau of Meteorology (BoM), CSIRO and the Tasmanian Fire Service (TFS), indicate that although bushfires are expected to become more frequent and intense in the

coming 20 years due to global warming, the reduced availability of fuel near various assets, and the increasing density of housing, combined with the more advanced technology and fire protection available in recent years suggests that current insurance levels are sufficient for this risk.

This is combined with evidence from the TFS that ignition sources have, in the vast majority of cases, not originated from transmission systems and equipment, as opposed to distribution networks, where the risks are appreciably higher as far as available statistics indicate. This lends weight to the expectation that Transend's exposure to bushfire liability is relatively low.

Transend had only a nominal amount of internal data available on events where fires had been caused around equipment. The main causes being associated with clearing of easements, maintenance, or shorts caused by birds or trees. None of these events were identified as significant since they had all occurred on low fire risk days, but there is a chance of an event on a high risk day (although there is a policy to stop all vegetation maintenance and line construction activities on high risk days) and Transend would be expected to retain the first $500k of damages in these cases.

So the conclusion of the discussions was that there seems to be no material exposure to Transend where a bushfire loss could be in excess of the purchased liability limit. So only under deductible losses need be considered here, which have been approximated above.

Employers' Liability

There are only 2 known cases of Transend incurring under deductible losses due to their Employers' liability (harassment discrimination type claims).

The total of under deductible losses for this most recent year were $51,600, so there is arguably an unbudgeted expense due to this exposure.

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Additional Risks

There were a number of additional risks that were deemed either too remote or had insufficient data to warrant further analysis at this time. These included

- Fraud, no history of exposure
- Industrial action: no prior events and this risk was considered to be outside of scope of the report
- Failures in supply from energy producers (Basslink and Tas Hydro): no exposure to Transend exists since they do not guarantee supply to their customers.
- Nemnet failure: no exposure to Transend
- Unauthorised Access to NOCS or control rooms: if Transend was negligent in allowing access, then this would be a liability risk, otherwise it would be a property/BI risk. Both are insured.

There is expected to be residual exposures from some these risks, but the component of the risks which falls outside the current budget is considered by Transend to be small to negligible.

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